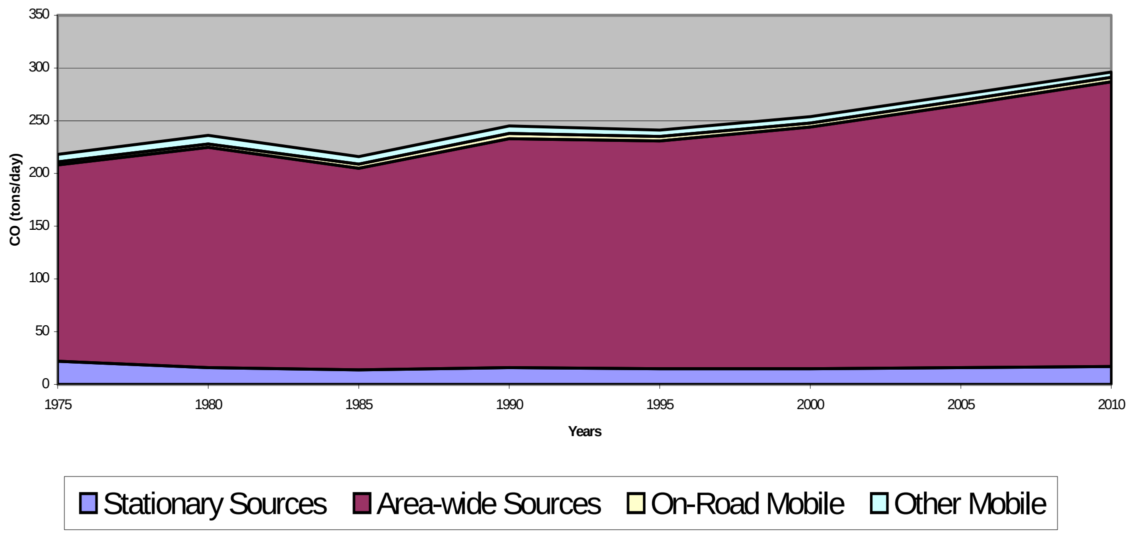


Figure 10 - Sacramento Valley Air Basin PM10 Trend

As shown in Figure 11, CO emissions are declining in the Sacramento Valley Air Basin. With new stringent emission standards, CO emissions from motor vehicles have declined. Stationary and area-wide source CO emissions have remained relatively steady, with additional emission controls offsetting growth. These controls will help keep the area in attainment for both the State and national CO standards.

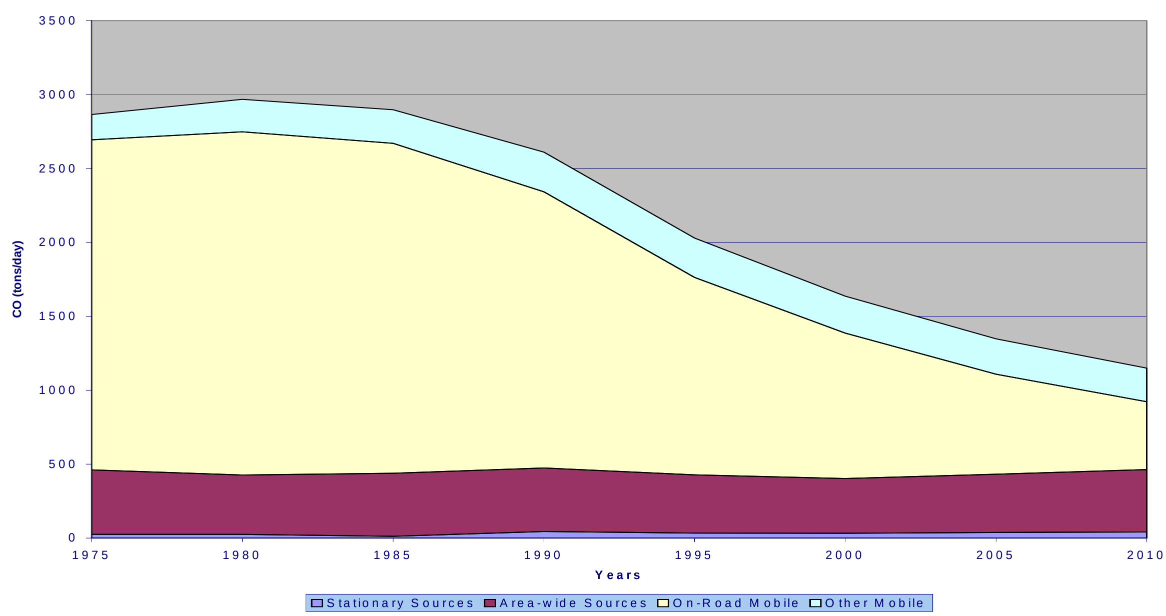
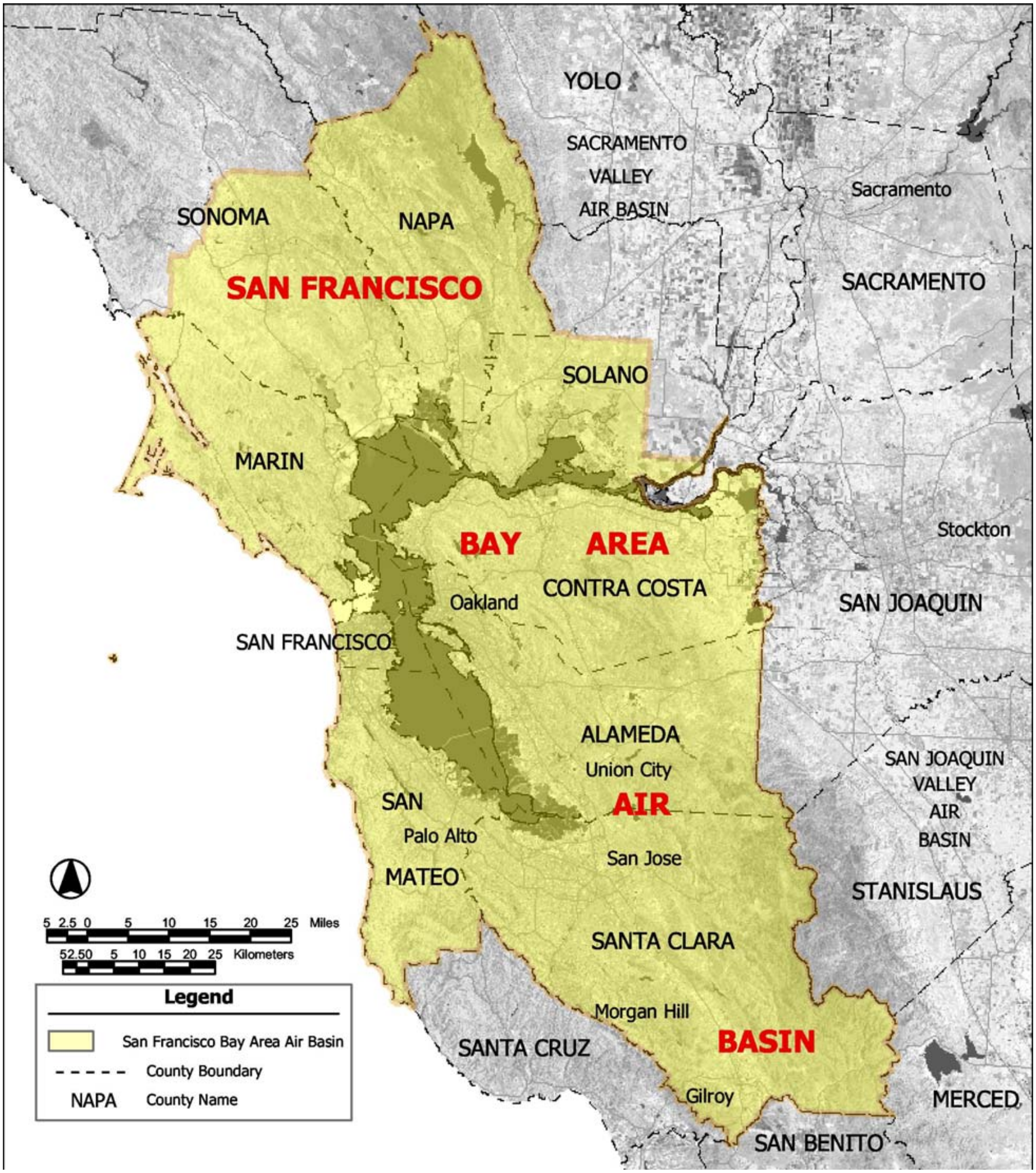


Figure 11 - Sacramento Valley Air Basin CO Trend

B SAN FRANCISCO BAY AREA AIR BASIN

The San Francisco Bay Area Basin is the state's second largest metropolitan area. As shown in Figure all or part of nine counties comprise the air basin. The counties in the air basin are: all of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, the southern half of Sonoma and the southwestern portion of Solano. The unifying feature of the basin is the Bay, which is oriented north-south and covers about 400 square miles of the area's total 5,545 square miles. Approximately 20 percent of California's population resides in the air basin. Pollution sources in the basin account for about 16 percent of the total statewide criteria pollutant emissions.

Figure 12- San Francisco Bay Area Air Basin



The climate of the San Francisco Bay Area varies from one location to the next. Along the coast, temperatures are mild year-round. Inland, temperatures show daily and seasonal variations. Overall the air quality is better than in the South Coast Air Basin. This is due to a more favorable climate, with cooler temperatures and better ventilation.

The population in the San Francisco Bay Area Air Basin has increased approximately 27 percent from 1981 to 2000, lower than the overall State average of 39%. During the same period, VMT increased approximately 69 percent, again lower than the overall State average of 91 percent.

The basin is classified as a State and national nonattainment area for O3. For CO, the basin is considered unclassified and/or attainment. For PM10, the basin is classified as a nonattainment area for the State standard and as a unclassified area for the national standard.

As shown in Figure 13 and Figure 14, emissions of O3 precursors (NOx and ROG) have decreased since 1975 and are projected to continue declining through 2010. This is the result of strict motor vehicle controls which have reduced mobile sources of these pollutants. Stationary source emissions of ROG have declined over the last 20 years due to new controls on oil refinery fugitive emissions and new rules for control of ROG from various industrial coatings and solvent operations.

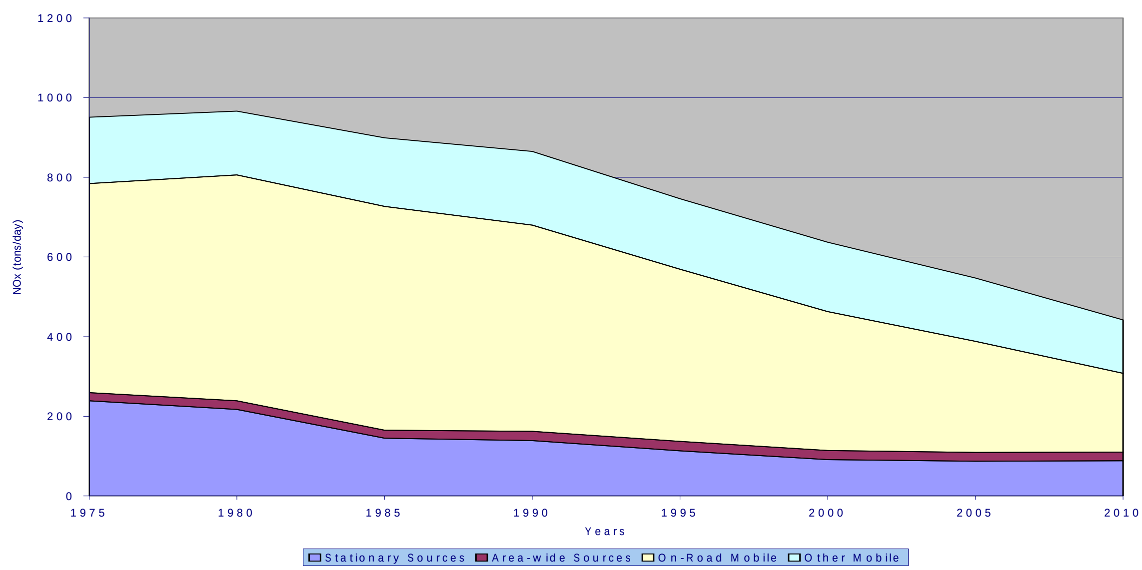


Figure 13 - San Francisco Bay Area Air Basin NOx Trend

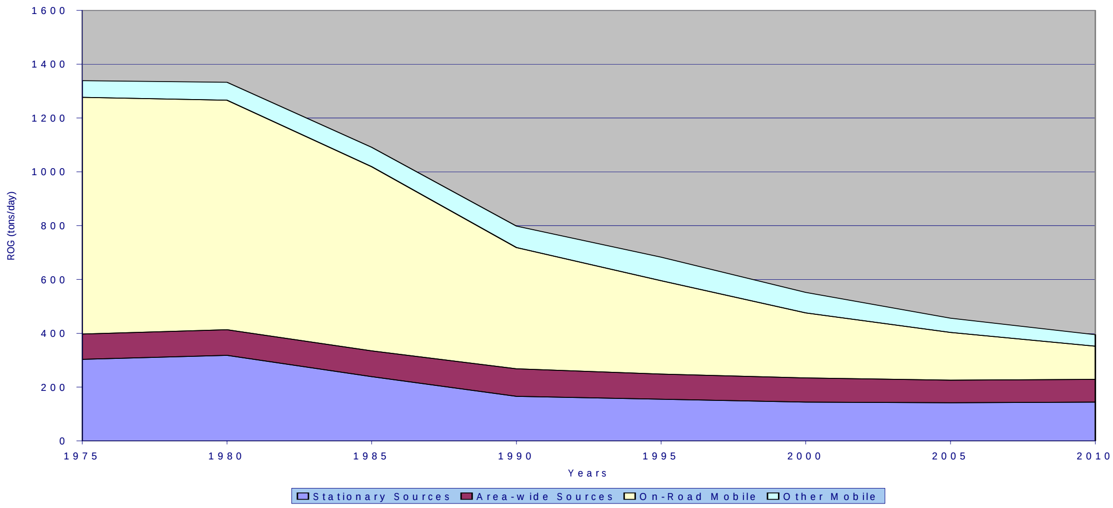


Figure 14 - San Francisco Bay Area Air Basin ROG Trend

Overall O3 concentrations are declining in the air basin. As shown in Figure 15, the peak 1-hour indicator declined about 12 percent from 1981 to 2000. Although the trend has not been consistently downward, the ambient concentrations generally declined from 1981 to 1994. Since 1994, the peak indicator values have been somewhat higher. However, it is not yet clear whether these data represent a significant change in the overall trend. Recent values have been slightly lower than values during the prior years.

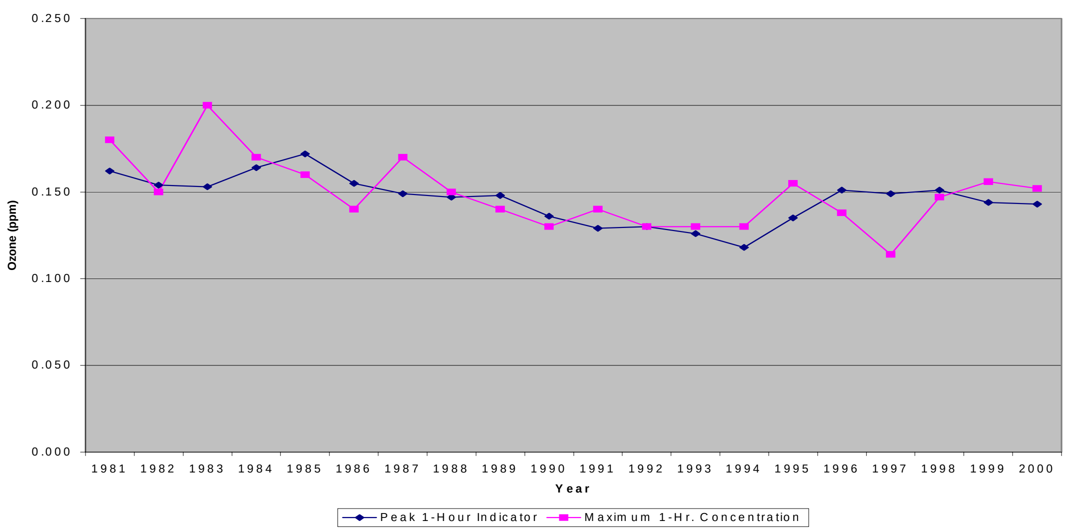


Figure 15 - San Francisco Bay Area Air Basin Ozone Trend

As shown in Figure , PM10 emissions are predicted to increase between 1975 and 2010. This increase is due to growth in emissions from area-wide sources, primarily fugitive dust sources. Mobile source emissions from diesel motor vehicles have been decreasing since 1990 even though population and VMT are growing. This is due to stringent emission standards.

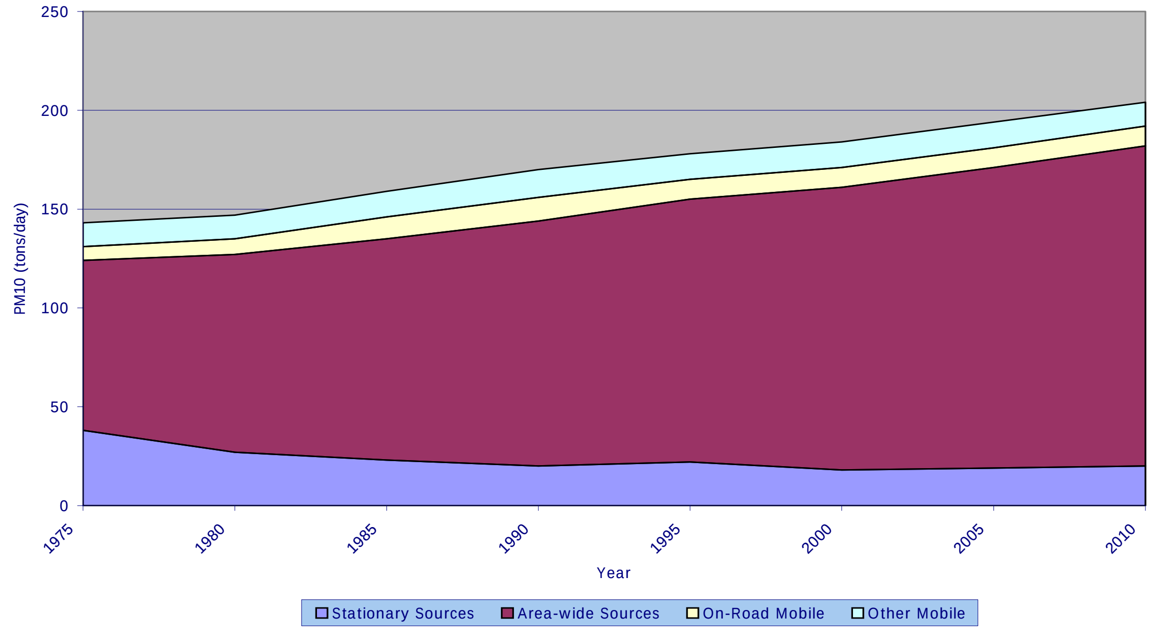


Figure 16 - San Francisco Bay Area Air Basin PM10 Trend

As shown in Figure 17, CO emissions have been declining in the basin over the last 25 years. Motor vehicles and other mobile sources are the largest sources of CO emissions in the air basin. Due to stringent controls measures, CO emissions from motor vehicles have been declining.

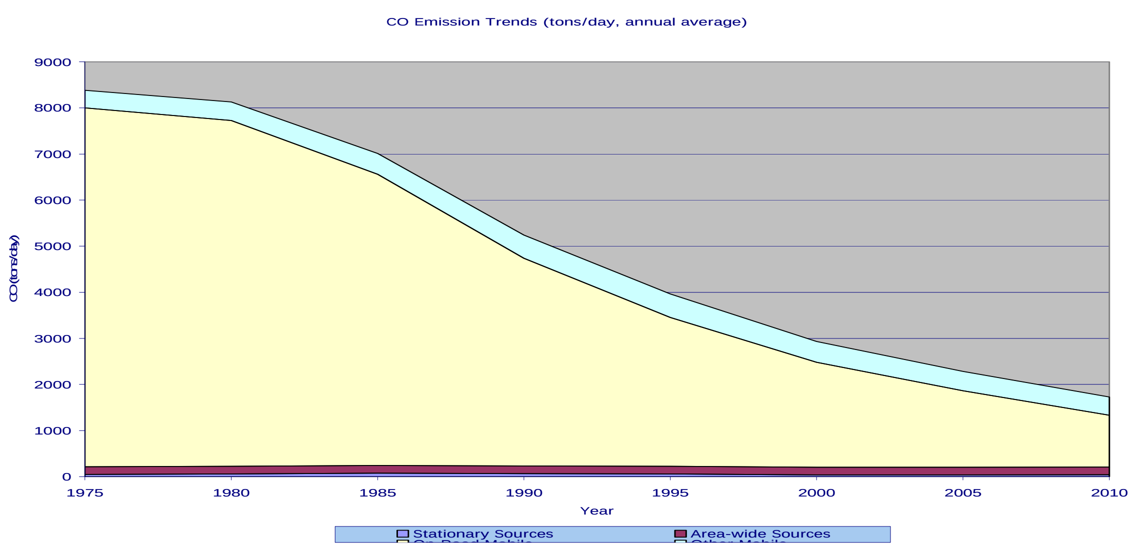
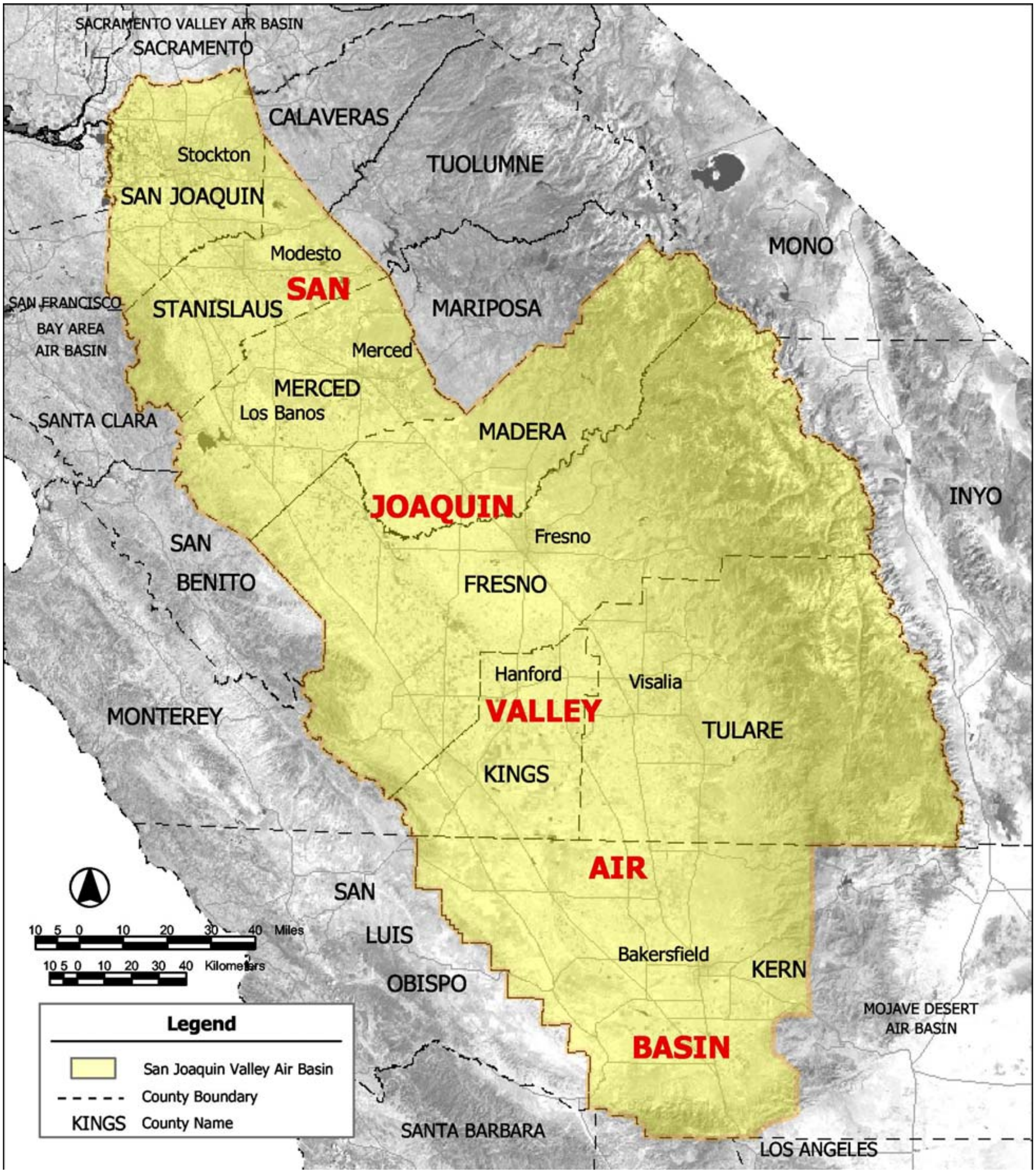


Figure 17 - San Francisco Bay Area Air Basin CO Trend

2.3.3 San Joaquin Valley Air Basin

The San Joaquin Valley Air Basin, shown in Figure 18, occupies the southern two-thirds of California's Central Valley.

Figure 18 - San Joaquin Valley Air Basin



The counties in this basin are: Fresno, Kings, Madera, Merced, San Joaquin, Stanislaus, Tulare and the western portion of Kern. The basin spreads across 25,000 square miles. The basin is mostly flat and unbroken with most of the area below 400 feet elevation. The San Joaquin river runs along the western side of the basin from south to north. The San Joaquin Valley has cool wet winters and hot dry summers. Generally the temperature increases and rainfall decreases from north to south. Air quality is not dominated by emissions from one large urban area in this basin. Instead, there are a number of moderately sized urban areas spread along the main axis of the Valley.

Approximately 9 percent of the State's population lives in the San Joaquin Valley. Pollution sources in the region account for about 14 percent of the total statewide criteria pollutant emissions. The basin is classified as a State and national nonattainment area for PM10. It is classified as a attainment and/or unclassified area for CO. The area is classified as a State and national nonattainment area for O3.

The population in the San Joaquin Valley Air Basin increased by 56 percent from 1981 to 2000. This is much higher than the statewide average of 39%. During the same time period, the daily VMT increased by 136 percent, again much higher than the overall statewide average of 91 percent. Overall the emission levels in the San Joaquin Valley Air Basin have been decreasing since 1990, with the exception of PM10. The rate of improvement however, has not been same as for other air basins. This is due mainly to the large growth rates this area has experienced.

Emissions of the O3 precursors, NOx and ROG are decreasing in the air basin. As shown in Figure 19 San Joaquin Valley Air Basin NOx Trend and Figure , NOx emissions have decreased by approximately 24 percent since 1985. They are predicted to decrease another 26% between 2000 and 2010. ROG emissions have decreased by approximately 48 percent since 1985. They are predicted to decrease another 11 percent between 2000 and 2010. These reductions have been the result of more stringent mobile and stationary source emission controls and standards.

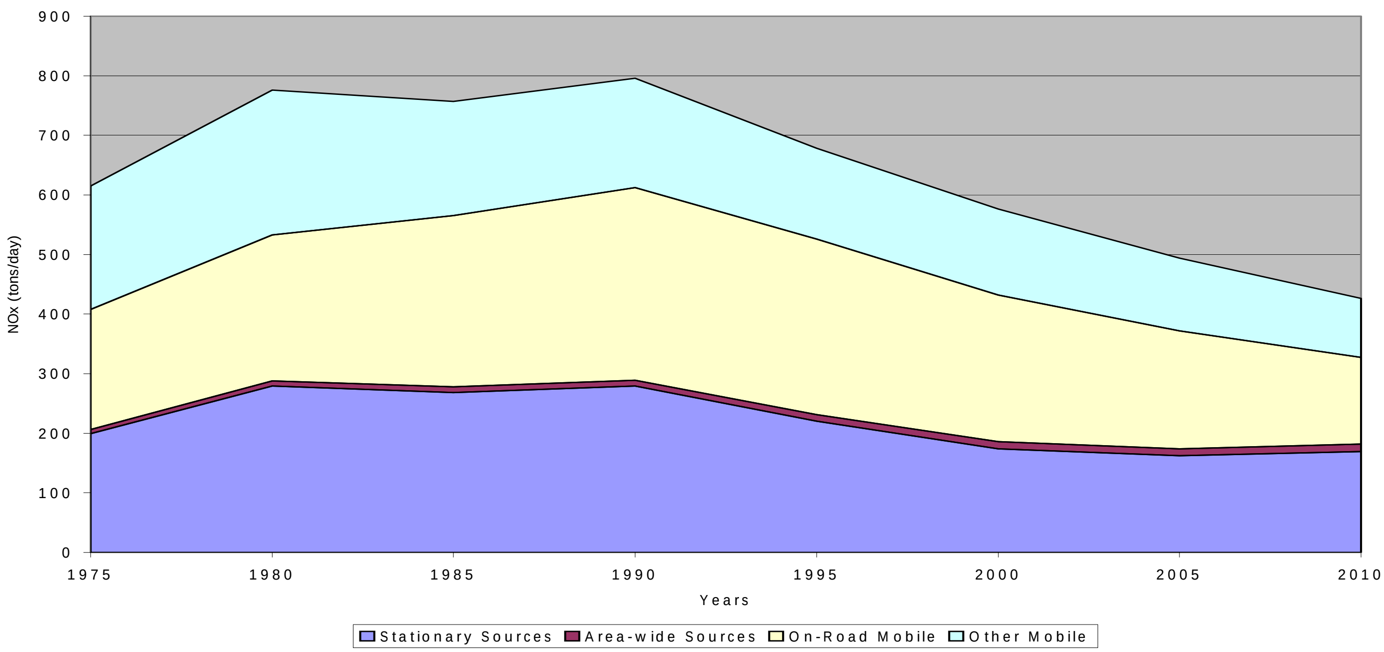


Figure 19 San Joaquin Valley Air Basin NOx Trend

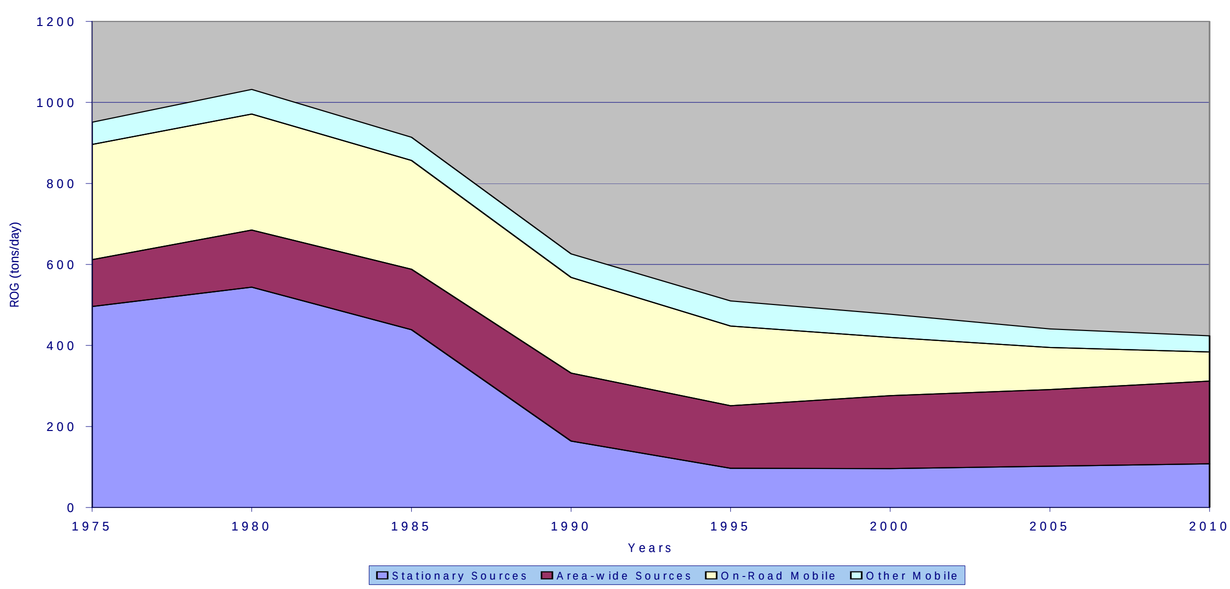


Figure 20 - San Joaquin Valley Air Basin ROG trend

The ozone problem in the air basin ranks among the most severe in the State. As shown in Figure 21, during 1981 through 2000, the maximum peak 1-hour indicator decreased slightly, on the order of 14 percent. The number of national 1-hour standard exceedance days has shown a greater improvement. During 1981 there were 69 national 1-hour standard exceedance days. In 2000, there were 30. The number of State standard exceedance days showed a smaller improvement with 130 days in 1981 and 114 in 2000. The basin has shown less improvement than other areas due in large part to the faster growth rates in population and VMT.

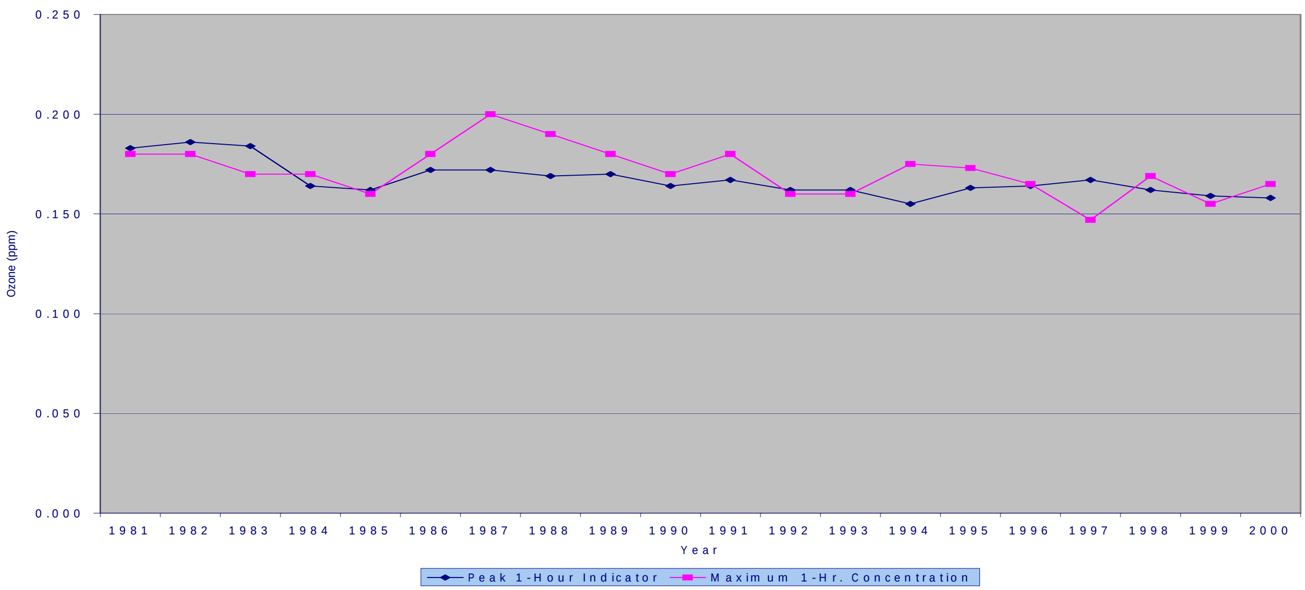


Figure 21 San Joaquin Valley Air Basin Ozone Trend

As shown in Figure 22, direct emissions of PM10 have been increasing in the air basin and are expected to continue increasing. This increase is due to growth in emissions from area-wide sources, primarily fugitive dust from vehicle travel on unpaved and paved roads, waste burning and residential fuel combustion. These increases are a direct result of the large growth in population and VMT. Mobile sources (emissions directly emitted from motor vehicles) are predicted to decrease between 1990 and 2010 due to new diesel standards.

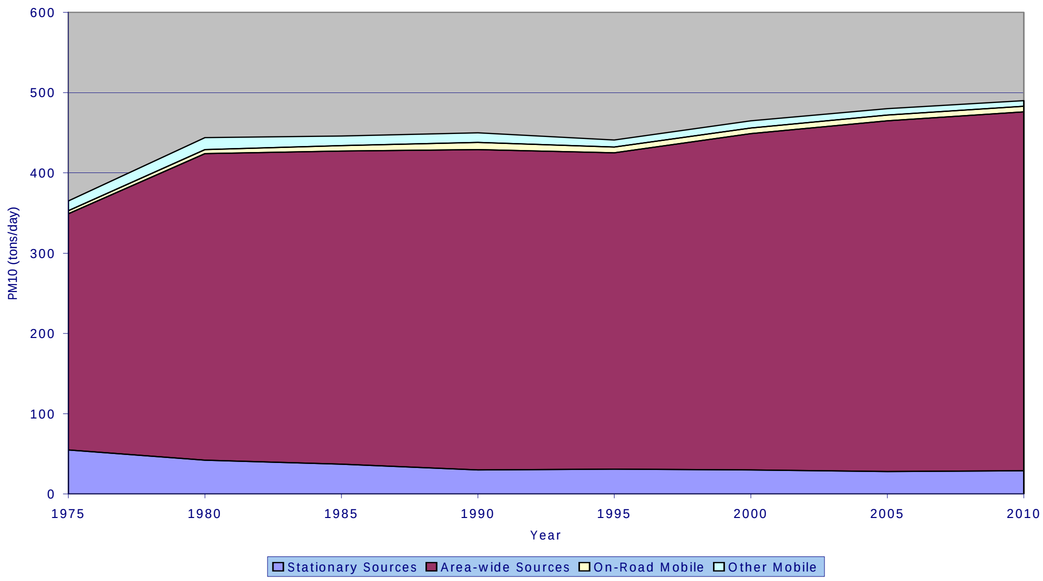


Figure 22 - San Joaquin Valley Air Basin PM10 Trend

As shown in Figure 23, CO emissions are trending downward between 1985 and 2010. Motor vehicle are the largest source of CO emissions in the air basin. Emissions from motor vehicles have been declining since 1985 despite increased VMT. This is due to stringent emission controls measures and standards.

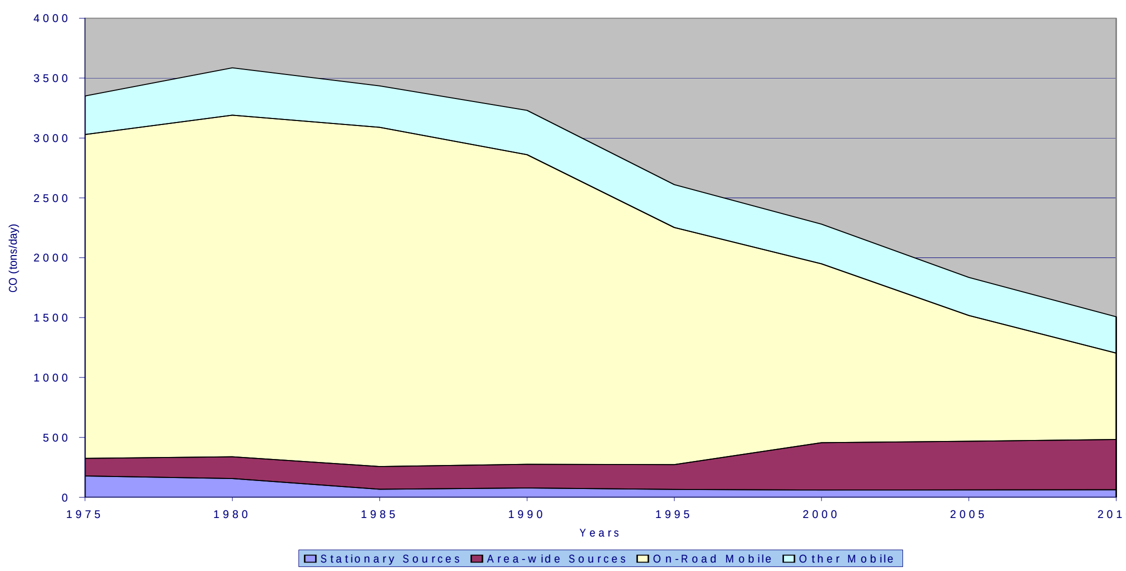
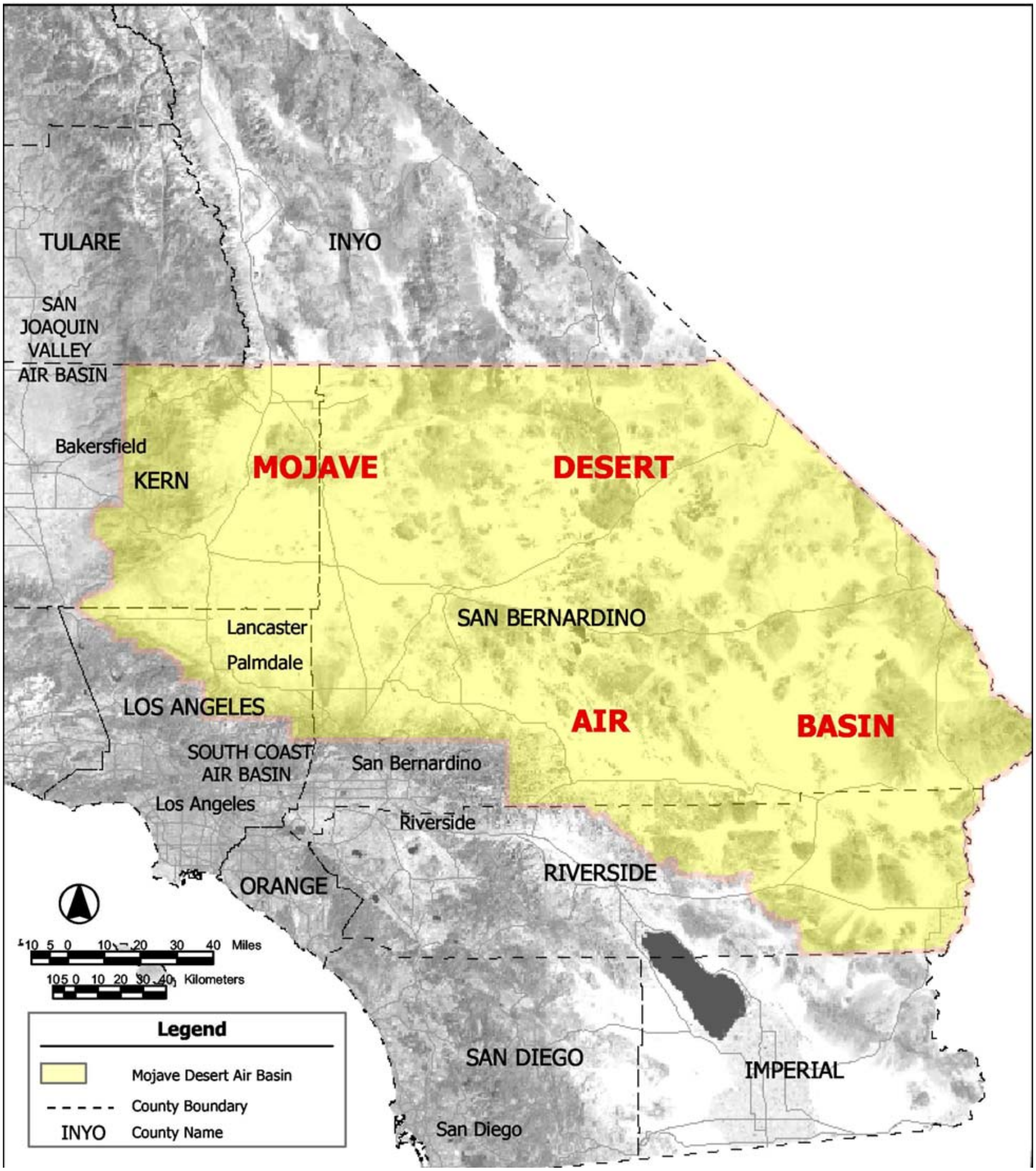


Figure 23 San Joaquin Valley Air Basin CO Trend

2.3.4 Mojave Desert Air Basin

The Mojave Desert Air Basin, shown in Figure 24, is located in the southeastern section of the state and is bordered on the south by the Salton Sea Air Basin, on the west by the South Coast and the San

Figure 24- Mojave Desert Air Basin



Joaquin Valley Air Basins, on the north by the Great Basin Valleys Air Basin and on the east by the States of Nevada to the north and Arizona to the south. It contains the high desert region of San Bernardino County and the desert portions of Kern and Los Angeles counties. With an area in excess of 25,950 square miles it's the second largest of the state's air basins and accommodates a population of 833,600. Air Quality is dominated by emissions from urban areas in the western portions of the basin and from transported emissions from the large urban areas to the south and west. Despite seeing a downward trend in O3 levels since 1995, the basin is classified as both state and national nonattainment area for Ozone (1-hour standard).

Historically communities such as Hesperia and Phelan, which are in close proximity to the Cajon Pass, experience the highest ozone levels in the basin. This is due to pollutants funneled into the High Desert through the pass from Los Angeles and the San Bernardino Valley which are dispersed as they are blown inland. Locally generated ozone precursor emissions of NOX and ROG also contribute to the high Ozone levels that affect the basin. Emission controls, mainly for exhaust emissions, have resulted in reductions in NOx, ROG and CO levels. Emissions of the Ozone precursors NOx and ROG have been trending downwards since 1990, as shown in Figure 25 and Figure 26.

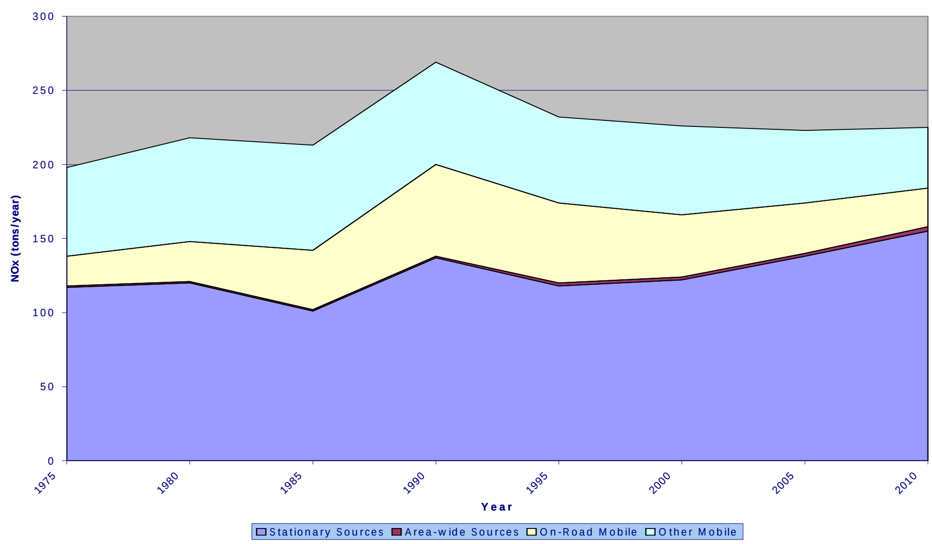


Figure 25 - Mojave Desert Air Basin NOx Trend

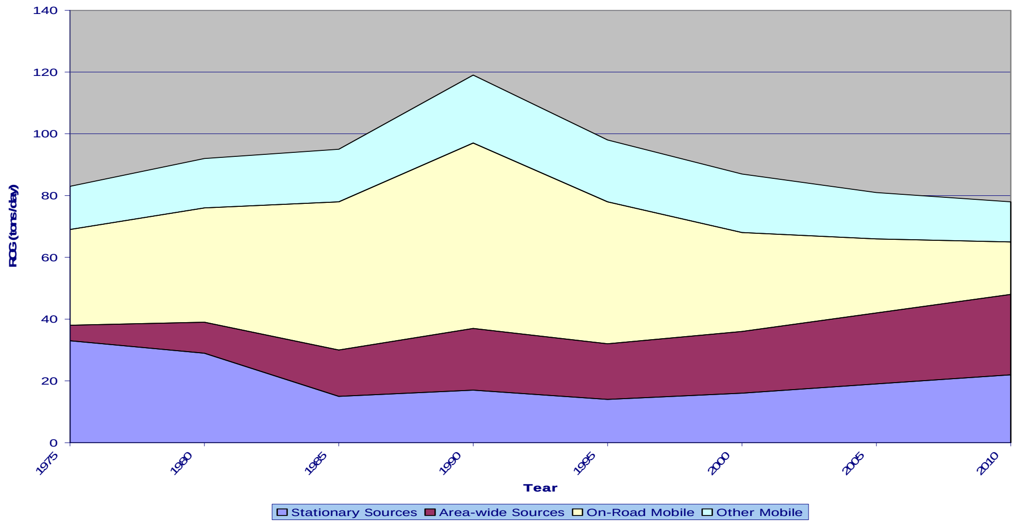


Figure 26 - Mojave Desert Air Basin ROG Trend

Figure 27 shows that CO emissions are on a downward trend .The portions of the basin in Kern and Riverside counties are unclassified for CO by the state 1-hour air quality standards while the portions of Los Angeles and San Bernardino counties in the basin are designated as attainment. The entire basin is designated as unclassified/attainment by the national ambient air quality standards.

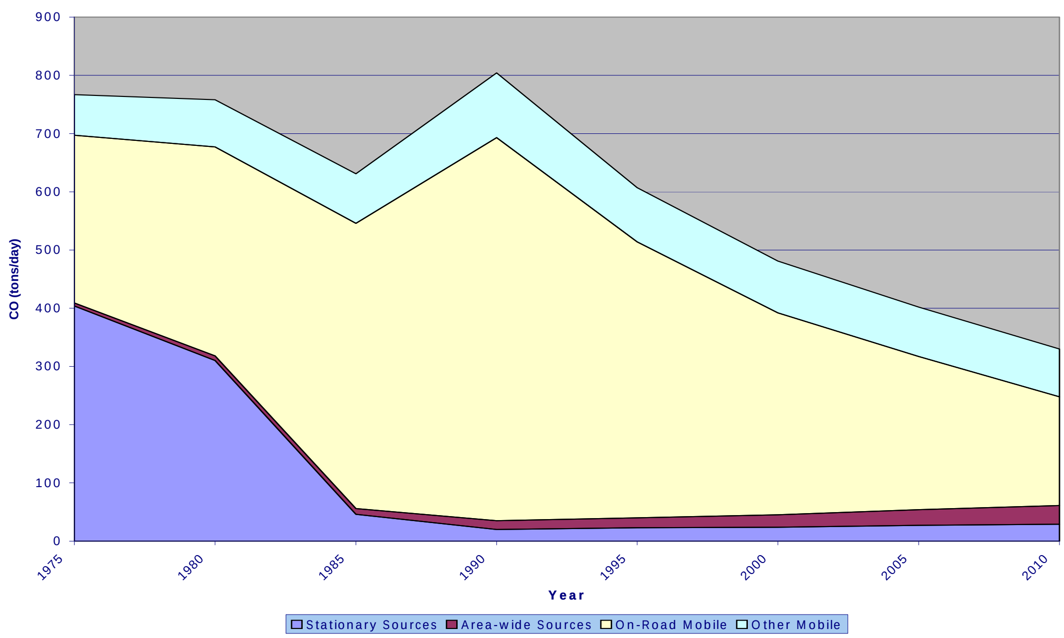


Figure 27- Mojave Desert Air Basin CO Trend

PM10 emissions in the basin, shown in Figure 28, continue to rise as volume of vehicles on unpaved roads and off-road increases. The trend is upward as shown by Figure 28. The basin is designated as nonattainment for PM10 by the state ambient air quality standards. Kern, Los Angeles and Riverside counties are unclassified while the remainder of the basin is designated as nonattainment for the national air quality standards.

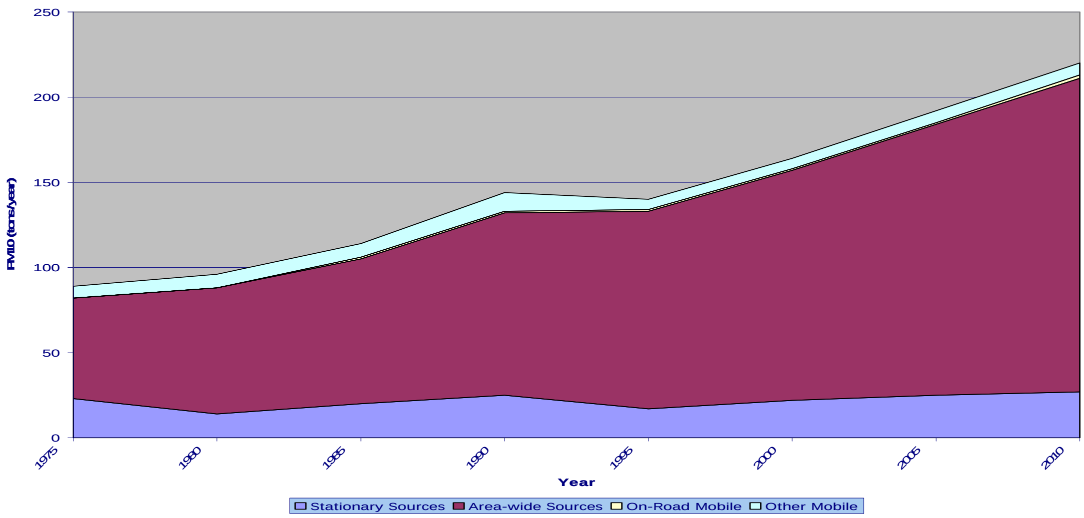


Figure 28 - Mojave Desert Air Basin PM10 Trend

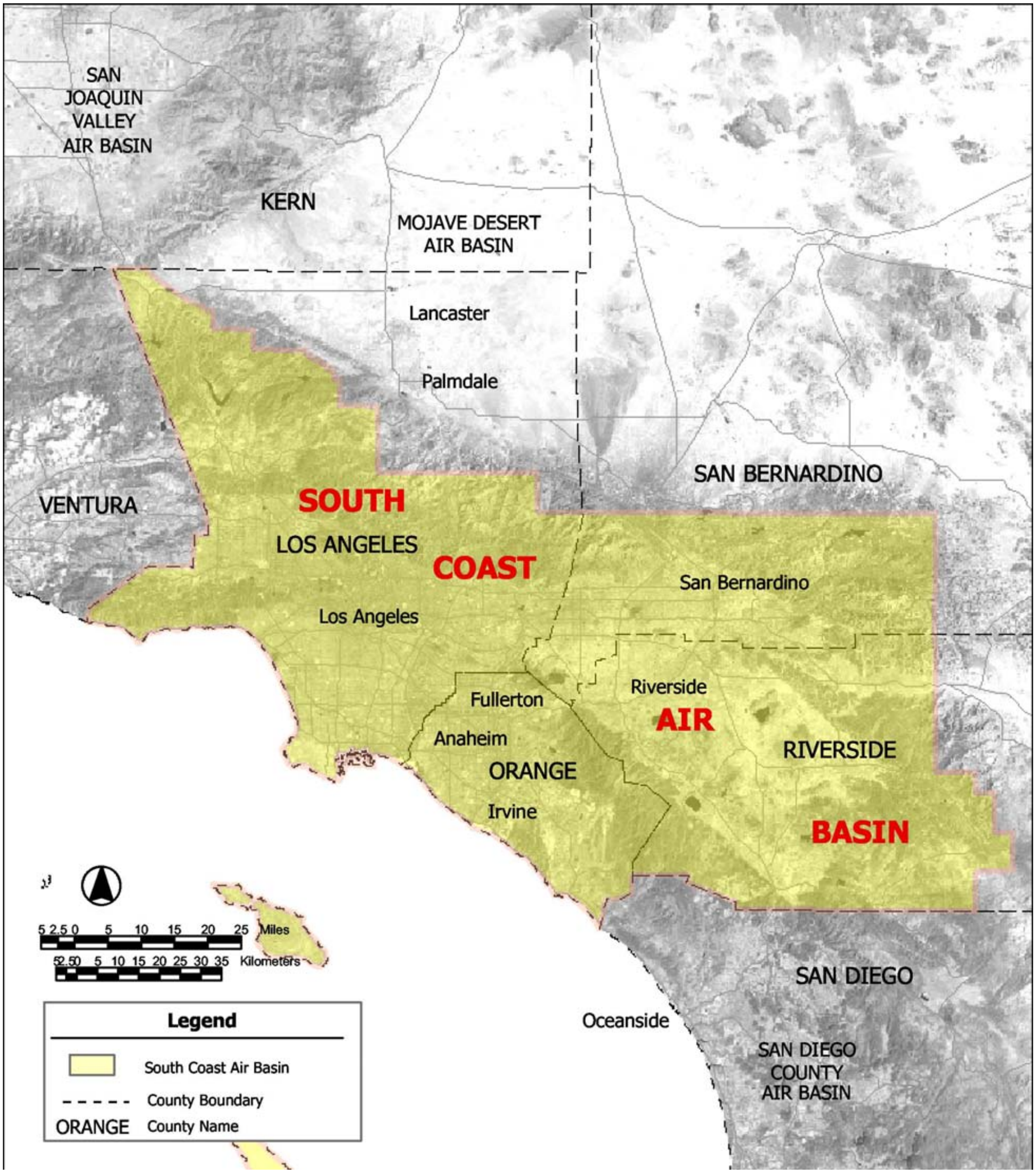
2.3.5 South Coast Air Basin

The South Coast Air Basin which occupies a total of 6,729 square miles, see Figure 29, is California's largest metropolitan region. It includes all of Orange county, the western highly urbanized portions of San Bernardino and Riverside counties as well as the southern two-thirds of Los Angeles county. With a population of 14.9 million it has more than 40 percent of California's population and is the most populous air basin in the state. It generates about 30 percent of the state's total criteria pollutant emissions The basin is generally a lowland plain bounded by the Pacific Ocean on the west and by mountains on the other three sides.

The population grew at high rates in the South Coast Air Basin from 1981 to 2000. It increased 34 percent from 11.1 million in 1981 to 14.9 in 2000. Consequently the number of vehicle miles traveled each day has increased about 84 percent. While high growth rates are associated with increases in emissions, the implemented control programs in the basin have resulted in emission decreases.

The warm weather associated with predominantly high pressure systems in the basin is conducive to the formation of ozone. The surrounding mountains assist in causing frequent low inversion heights and stagnant air conditions. These factors combine to trap pollutants in the air basin resulting in concentrations among the highest in the state. Aggressive emission controls have resulted in a downward

Figure 29 - South Coast Air Basin



trend in Ozone levels as shown in Figure 30. The basin is classified as both state and national nonattainment areas for Ozone (1-hour standard).

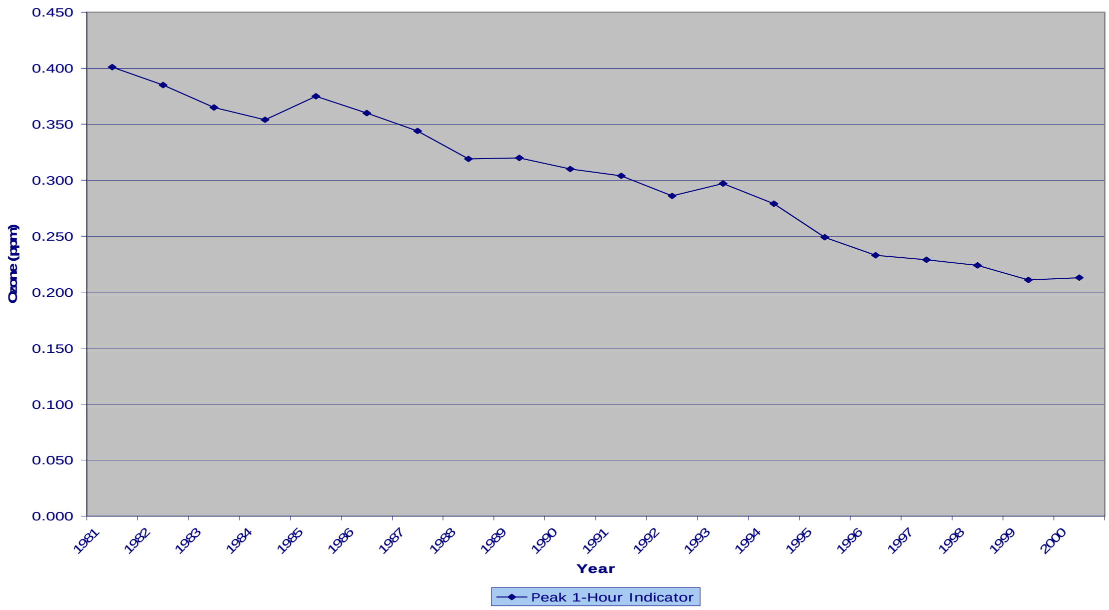


Figure 30 - South Coast Air Basin Ozone Trend

Emissions of the ozone precursors NOX, ROG have been decreasing in the basin. NOX emissions have fallen by about 38 percent from 1985 to 2000 and is forecasted to continue that trend to 2010, see Figure 31.

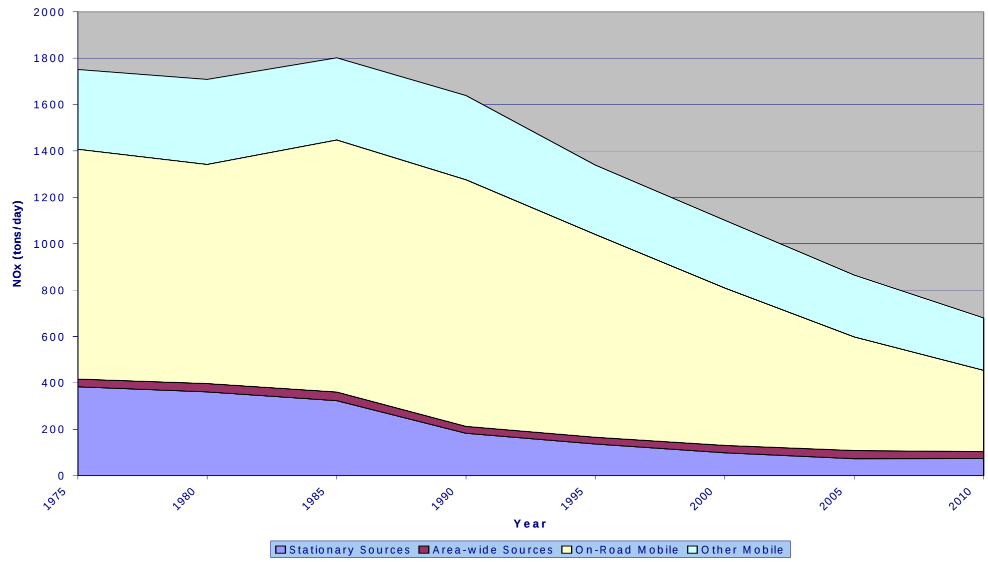


Figure 31 - South Coast Air Basin NOx Trend

ROG emissions remained relatively flat from 1975 to 1985 then decreased by approximately 60 percent between 1985 and 2000 and are predicted to continue to decrease another 40 percent by 2010, see Figure 32.

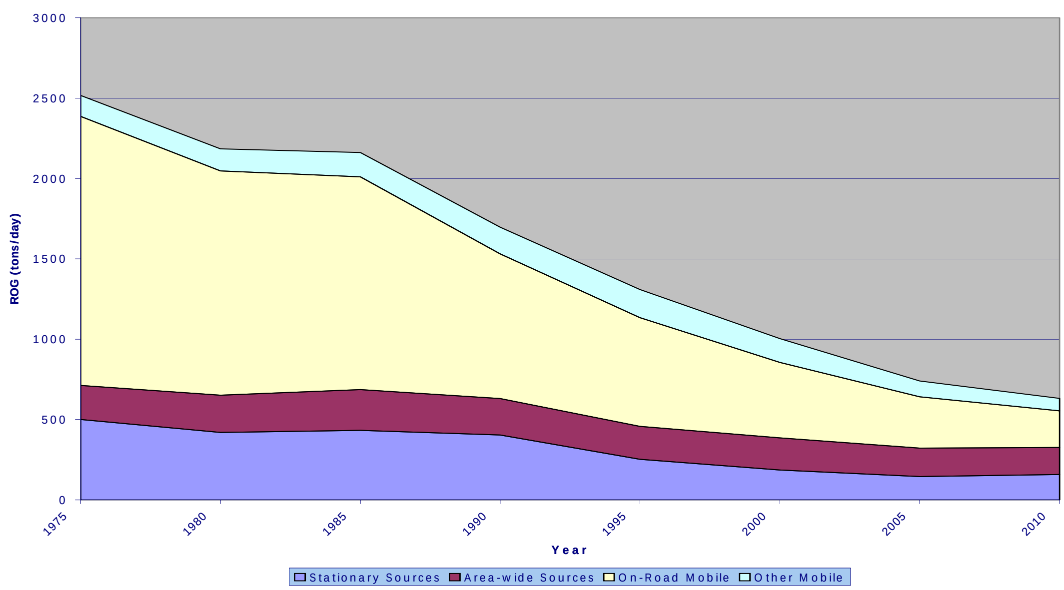


Figure 32 - South Coast Air Basin ROG Trend

Emissions of CO have been trending downward since 1975 in the South Coast Air Basin, see Figure 33, even though motor vehicle miles traveled have increased and industry activity has grown. Los Angeles county is designated as nonattainment for the state ambient air quality standards while the remainder of the air basin is classified as attainment. The basin is designated as nonattainment for CO for the national ambient air quality standards.

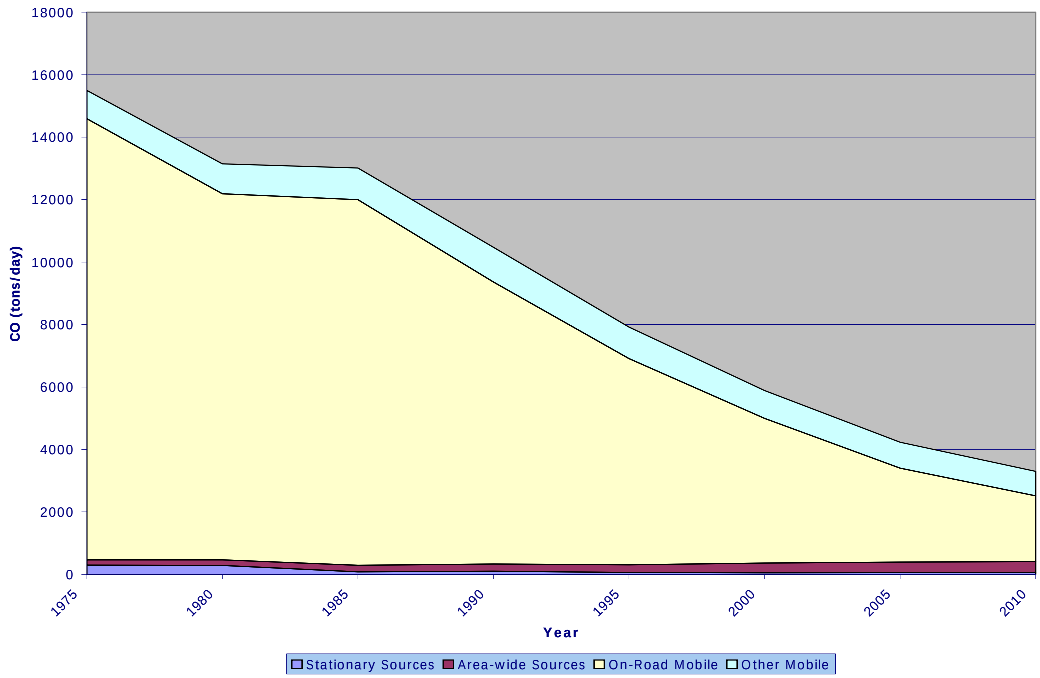


Figure 33 - South Coast Air Basin CO Trend

The South Coast Air Basin has been seeing an increase in direct emissions of PM10 since 1975, see Figure 34, which is attributed to emissions from area-wide sources such as fugitive dust from paved and

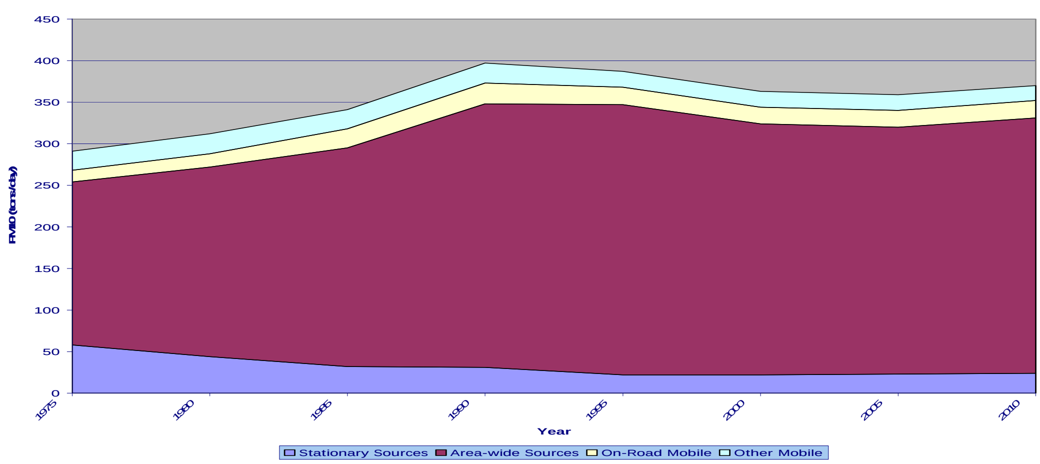


Figure **34- South Coast Air Basin PM10 Trend** unpaved roads. These increases in activity of the area-wide sources reflect the increased growth and vehicle miles traveled in the basin. PM10 continues to be a problem in the South Coast Air Basin which is designated as nonattainment for both the state and national ambient air quality standards. More controls specific to PM10 will be needed to reach attainment.

2.3.6 San Diego Air Basin

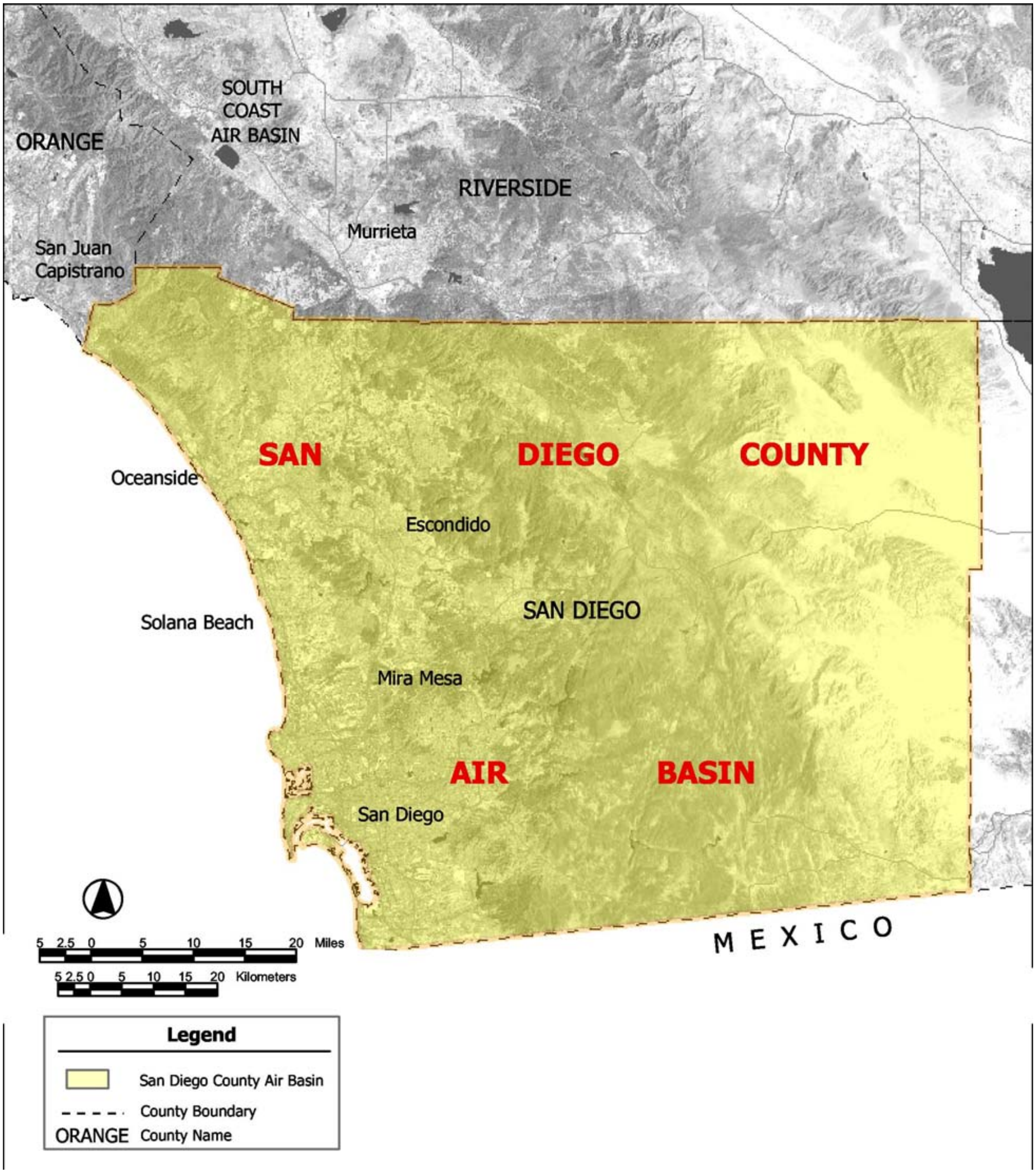
The San Diego Air Basin, shown in Figure 35, is located in southwestern corner of California and comprises all of San Diego County. It is bounded on the south by Mexico, on the west by the Pacific Ocean, on the north by Orange and Riverside counties and on the east by Imperial county. Its 4,260 square mile area accommodates a population of 2.9 million or 8 percent of the state's population and produces about 7 percent of the state's criteria pollutant emissions.

In the last 20 years the San Diego Air Basin has experienced one of the highest population growth rates of the state's urban areas. Population grew from over 1.9 million in 1981 to 2.9 million in 2000. The number of daily vehicle miles traveled increased over 100 percent during that same period from 35 million to about 74 million. Despite this growth trend, the overall air quality of the basin has improved, indicating the benefits of cleaner technology.

Much of the San Diego Air Basin has a relatively mild climate due its southern location and proximity to the ocean. Because the majority of the population is concentrated in the western portion of the basin, the emissions are concentrated there as well. The basin is impacted by locally produced emissions as well as pollutants transported from other areas. Ozone and ozone precursor emissions are transported from the South Coast Air Basin and Mexico. Implemented controls have resulted in a downward trend in Ozone levels, see Figure 36, and reductions in emissions from it's precursors NOX and ROG in the basin. However, Ozone levels continue to pose problems as occurrences of exceedances of the state and national ambient air quality standards persist. There were 24 exceedances of the state 1-hour standard and 16 exceedances of the national 8-hour standards in 2000.

Emissions from the Ozone precursor NOX has been steadily declining since 1990 after remaining relatively flat from 1975 to 1990, see Figure 37. Similarly, ROG emissions have been decreasing overall since 1980, see Figure 38. These decreases are mainly due to the enforcement of more stringent motor vehicle emission standards. ROG emissions from stationary and area-wide sources have remained mostly unchanged over the past 20 years.

Figure 35 - San Diego Air Basin



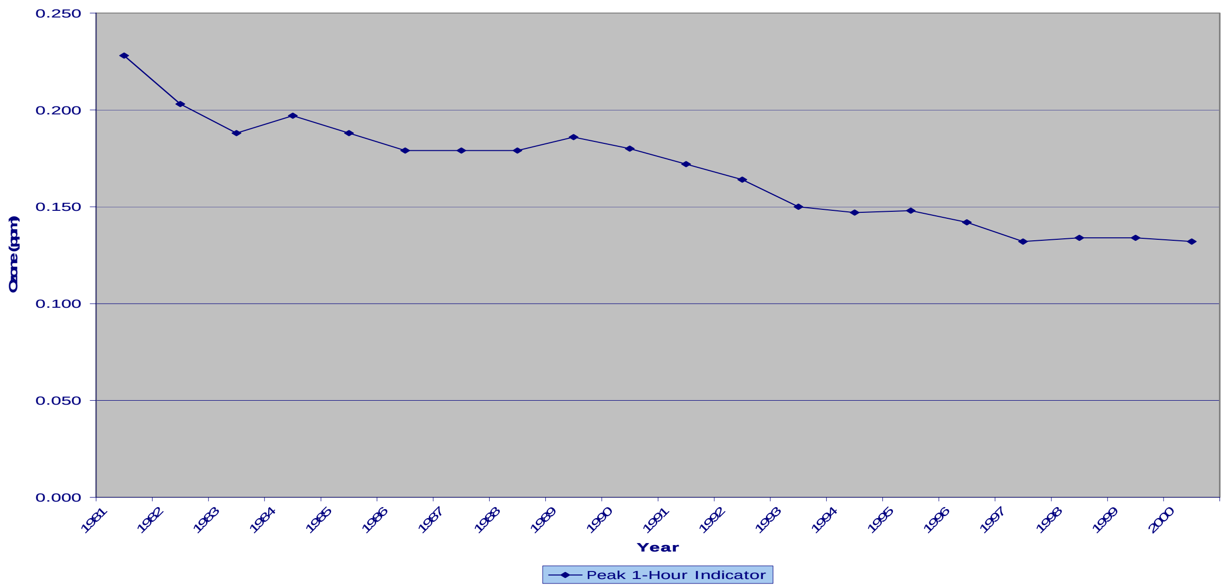


Figure 36 – San Diego Air Basin Ozone Trend

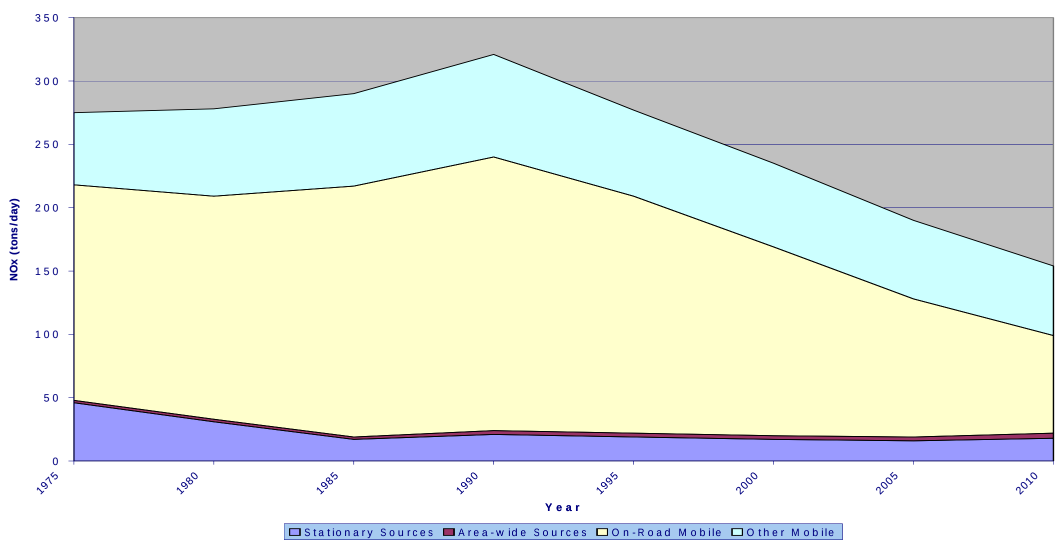


Figure 37 - San Diego Air Basin NOx Trend

CO (peak 8-hour) concentrations in the San Diego Air Basin decreased substantially, see Figure 39, from 1981 to 2000, approximately 56 percent. As a result, the national CO standards have not been exceeded since 1989 and the state standard since 1990. The basin should maintain it's attainment status for both national and state standards by continuing the enforcement of the stringent motor vehicle regulations currently in place.

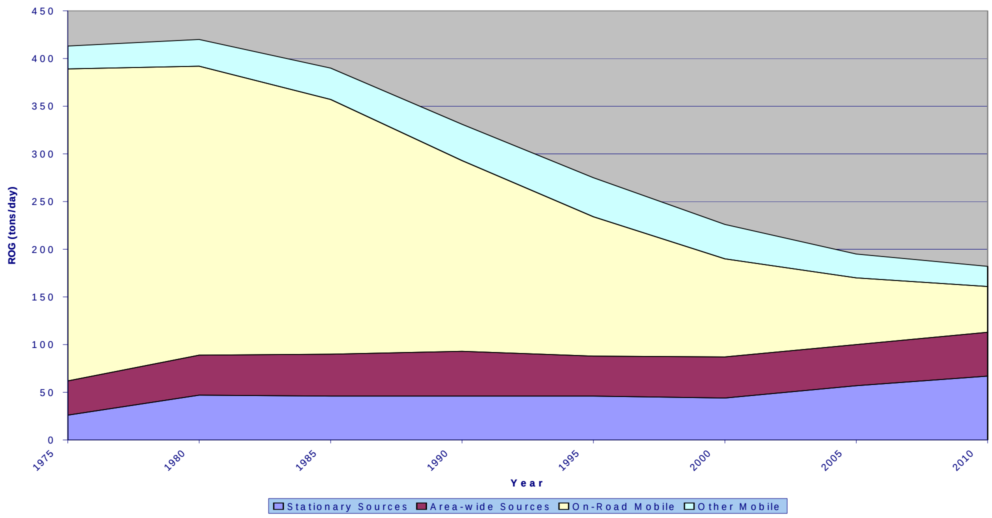


Figure 38 - San Diego Air Basin ROG Trend

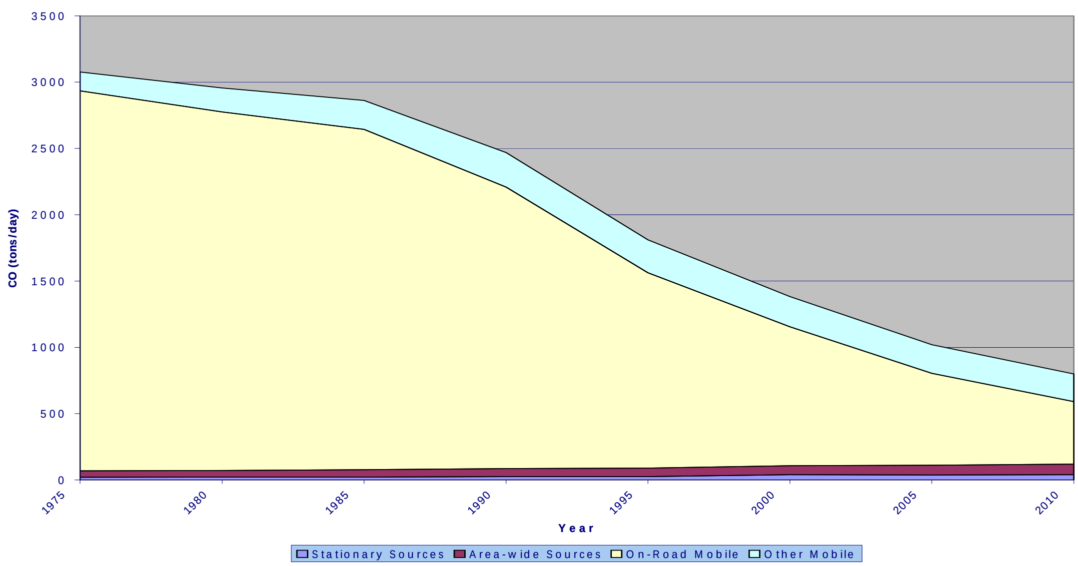


Figure 39 - San Diego Air Basin CO Trend

Direct emissions of PM10 in the San Diego Air Basin have increased 69 percent from 1975 to 2000 and the forecast is for a continued increase at a rate of approximately 7 percent to 2010, see Figure 40. Growth in area-wide source emissions, mainly fugitive dust from vehicles on paved and unpaved roads, dust from construction and demolition operations, and particulates from residential fuel combustion are mainly responsible for this increase. The growth in these area-wide sources are primarily due to the huge population and vehicle miles traveled in the basin. The San Diego Air Basin is designated as nonattainment for the state ambient air quality standard and is unclassified for the national standard.

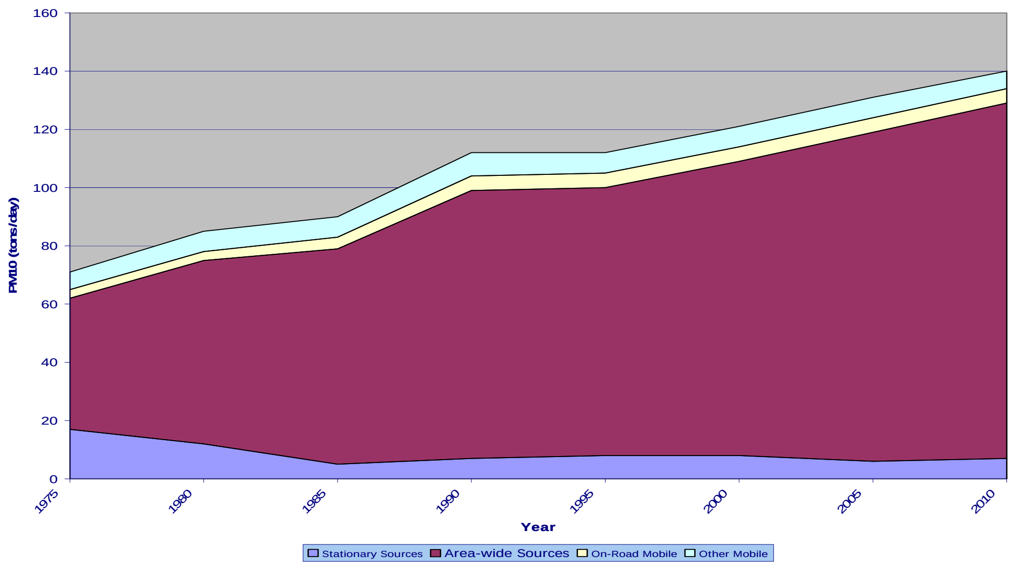


Figure 40 - San Diego Air Basin PM10 Trend

3.0 AFFECTED ENVIRONMENT: EVALUATION OF IMPACTS METHODOLOGY

3.1 POLLUTANTS FOR ANALYSIS

Pollutants that can be traced principally to transportation sources and are thus relevant to the evaluation of the project alternatives include CO, O_3 precursors (NO_x and TOG), PM_{10}, and CO_2. Since high CO levels are mostly the result of congested traffic conditions combined with adverse meteorological conditions, high CO concentrations are limited to within 300 ft to 600 ft (91 m to 183 m) of heavily-traveled roadways. Concentrations of CO on a regional and localized or microscale basis can consequently be predicted appropriately. As discussed above in the affected environment section, TOG and NO_x emissions from mobile sources are of concern primarily because of their role as precursors in the formation of O_3 and particulate matter. O_3 is formed through a series of reactions that occur in the atmosphere in the presence of sunlight over a period of hours. Since the reactions are slow and occur as the pollutants are diffusing downwind, elevated O_3 levels are often found many miles from sources of the precursor pollutants. The impacts of TOG and NO_x emissions are therefore generally examined on a regional level. CO_2 emission burdens, because of their global impact, are currently expressed only on the statewide level by CARB and EPA. In this analysis, therefore, CO_2 impacts are discussed on the statewide level. It is appropriate to predict concentrations of PM_{10} on a regional and localized basis. EPA is currently developing a standardized methodology to evaluate PM_{10} on a local level.

3.2 POLLUTANT BURDENS

The air quality analysis for this Program EIR/EIS focuses on the potential statewide, regional and localized impacts on air quality. The regional pollutant burdens were estimated based on changes that would occur under each of the alternatives including:

- Highway vehicle miles traveled (VMT).
- Number of plane operations.
- Number of train movements (proposed HST and existing LOSSAN system).
- Power requirements for the proposed HST system.

To quantify the project's impact on regional pollutant levels, a baseline pollutant burden for each of the affected air basins is provided. This baseline level represents the emissions under the future No Build/No

Action scenario. The information was developed using ARB pollutant burden projections for the year 2020, which corresponds to the project's design year. These projections are based on future growth levels in stationary, area-wide, and mobile sources. The projections are done for all criteria pollutants. A sample of the mobile source section of the CO database, on a State-wide basis is provided in Table 3. As seen Table , ARB details the source category into subcategories. For mobile sources, there are two categories, on-road and off-road. Vehicles licensed for highway use are considered on-road mobile sources. Airplanes, marine vessels, locomotives, construction and lawn/garden equipment and recreation off-road vehicles are considered off-road mobile sources.

Localized air quality impacts were estimated near proposed station locations and airports potentially affected by the Modal and HST Alternatives. The potential impacts of these alternatives were compared with existing conditions and with the No Project Alternative.

A comparison of the 2002 conditions to the 2020 No Project conditions illustrates the expected trends in air quality. The potential impacts from proposed alternatives were then added to the 2020 baseline conditions. Changes in VMT for on-road mobile sources (vehicles) and for off-road mobile sources (number of plane operations and train movements) were estimated for each of the alternatives. Changes in emissions of stationary sources (electrical power generators) were also assessed.

3.2.1 Highway VMT

On-road pollutant burdens were calculated as a ratio of baseline VMT to estimated VMT changes under each alternative. Although vehicular speeds affect emission rates, the potential basin-wide speed changes were considered too small to affect overall emission estimates; thus changes in future on-road mobile source emission burdens for the project were based solely on VMT changes and did not consider speed.

3.2.2 Number of Plane Operations and Train Movements:

The Federal Aviation Administration's (FAA's) Emission and Dispersion Modeling System (EDMS) is used to estimate airplane emissions. The EDMS model estimates the emissions generated from a specified number of landing and take-off (LTO) cycles. Plane emissions are only regulated up to 1000 meters altitude. These emissions are represented in the LTO cycle. Along with the emissions from the planes themselves, emissions generated from associated ground maintenance requirements are also included. Average plane emissions are calculated based on a typical 737 aircraft, as per the Systems Definition Report. The pollutant burdens generated by the LTOs under each alternative were added to CARB's off-road mobile sources (planes) emission budgets for each air basin to determine the potential impacts of the alternatives.

Table 3 - Sample ARB Carbon Monoxide Emission Burden Estimates Year 2020, Statewide

Area	Source type	Category	Sub-Category	Pollutant	Season	Control Type	2020 Burden (tons/day)
STATEWIDE	MOBILE	ON-ROAD MOTOR VEHICLES	LIGHT DUTY PASSENGER (LDA)	CO	ANNUAL AVERAGE	GROWN AND CONTROLLED	1194.916
STATEWIDE	MOBILE	ON-ROAD MOTOR VEHICLES	LIGHT DUTY TRUCKS - 1 (LDT1)	CO	ANNUAL AVERAGE	GROWN AND CONTROLLED	335.566
STATEWIDE	MOBILE	ON-ROAD MOTOR VEHICLES	LIGHT DUTY TRUCKS - 2 (LDT2)	CO	ANNUAL AVERAGE	GROWN AND CONTROLLED	521.423
STATEWIDE	MOBILE	ON-ROAD MOTOR VEHICLES	MEDIUM DUTY TRUCKS (MDV)	CO	ANNUAL AVERAGE	GROWN AND CONTROLLED	342.981
STATEWIDE	MOBILE	ON-ROAD MOTOR VEHICLES	LIGHT HEAVY DUTY GAS TRUCKS - 1 (LHDV1)	CO	ANNUAL AVERAGE	GROWN AND CONTROLLED	76.187
STATEWIDE	MOBILE	ON-ROAD MOTOR VEHICLES	LIGHT HEAVY DUTY GAS TRUCKS - 2 (LHDV2)	CO	ANNUAL AVERAGE	GROWN AND CONTROLLED	11.28
STATEWIDE	MOBILE	ON-ROAD MOTOR VEHICLES	MEDIUM HEAVY DUTY GAS TRUCKS (MHDV)	CO	ANNUAL AVERAGE	GROWN AND CONTROLLED	63.571
STATEWIDE	MOBILE	ON-ROAD MOTOR VEHICLES	HEAVY HEAVY DUTY GAS TRUCKS (HHDV)	CO	ANNUAL AVERAGE	GROWN AND CONTROLLED	36.509
STATEWIDE	MOBILE	ON-ROAD MOTOR VEHICLES	MEDIUM HEAVY DUTY DIESEL TRUCKS (MHDV)	CO	ANNUAL AVERAGE	GROWN AND CONTROLLED	21.168
STATEWIDE	MOBILE	ON-ROAD MOTOR VEHICLES	HEAVY HEAVY DUTY DIESEL TRUCKS (HHDV)	CO	ANNUAL AVERAGE	GROWN AND CONTROLLED	39.831
STATEWIDE	MOBILE	OTHER MOBILE SOURCES	AIRCRAFT	CO	ANNUAL AVERAGE	GROWN AND CONTROLLED	312.8855
STATEWIDE	MOBILE	OTHER MOBILE SOURCES	TRAINS	CO	ANNUAL AVERAGE	GROWN AND CONTROLLED	20.3153
STATEWIDE	MOBILE	OTHER MOBILE SOURCES	SHIPS AND COMMERCIAL BOATS	CO	ANNUAL AVERAGE	GROWN AND CONTROLLED	24.4782
STATEWIDE	MOBILE	OTHER MOBILE SOURCES	RECREATIONAL BOATS	CO	ANNUAL AVERAGE	GROWN AND CONTROLLED	568.4367
STATEWIDE	MOBILE	OTHER MOBILE SOURCES	OFF-ROAD RECREATIONAL VEHICLES	CO	ANNUAL AVERAGE	GROWN AND CONTROLLED	329.9724
STATEWIDE	MOBILE	OTHER MOBILE SOURCES	OFF-ROAD EQUIPMENT	CO	ANNUAL AVERAGE	GROWN AND CONTROLLED	1153.2423
STATEWIDE	MOBILE	OTHER MOBILE SOURCES	FARM EQUIPMENT	CO	ANNUAL AVERAGE	GROWN AND CONTROLLED	100.6847
STATEWIDE	MOBILE	OTHER MOBILE SOURCES	FUEL STORAGE AND HANDLING	CO	ANNUAL AVERAGE	GROWN AND CONTROLLED	0

Ridership projections for the HST system varied between 42 million and 68 million passengers (including 10 million long-distance commuters) for 2020, with potential for significantly higher ridership beyond 2020. The figures on the lower end of these estimates are considered *investment-grade forecasts,* which were used in the Authority's Business Plan and are based conservatively on current costs, travel times, and congestion levels of air and automobile transportation. The figures on the higher end are based on a *sensitivity analysis*, which assumes the increased costs and congestion associated with air and automobile travel would result in greater potential ridership for the intercity high-speed train system. The sensitivity analysis started with the investment-grade ridership forecasts and applied variations in mode characteristics that tend to increase HST ridership and revenue to determine how sensitive HST ridership is to travel times, fares, etc. This sensitivity analysis produced a higher ridership forecast that is used in this Program EIR/EIS to define a maximum impact potential of the Modal and HST Alternatives.

For this report and the overall Program EIR/EIS process, the higher demand forecast of 68 million riders (58 million intercity trips and 10 million commute trips), based on the sensitivity analysis, offers a more reasonable scenario to represent total capacity, while serving as a representative worst-case scenario for defining the physical and operational aspects of the alternatives in 2020. This higher forecast is generally used as a basis for defining the Modal and HST Alternatives and is referred to in this report as the *representative demand*. In some specific analyses such as this air quality analysis, the high-end forecasts result in a benefit because of additional VMT being removed from the road and a decrease in LTO cycles for planes In those cases, additional analysis is included in this Program EIS/EIR also to address the impacts associated with the low-end (investment-grade) forecasts.

To determine the number of plane trips potentially replaced from the No Project scenario daily by the HST Alternative, the following calculations were performed using sensitivity ridership variation projections as defined above. The number of annual air trips that could be removed by the proposed HST system (25.3 million) was divided by an average number of passengers per flight (101.25). The resulting number of flights per year (250,551) was then divided by the number of days per year to reach the number of flights per day (771) that could potentially be removed by the proposed HST system.

> 25.3 million trips = 25.3 million flying passengers (1 trip = 1 takeoff and 1 landing)
> 1 flight = 101.25 passengers (135 seats X 75 percent load factor, as per Table 3.2-3.
> System Definition Report [cite])

Therefore,

> 250,551 flights/year = (25,368,285 passengers/year) / (101.25 passengers/flight)
> 771 flights/day = 250,551 flights/year X 1 year / 325 days

Similar calculations were prepared for the proposed HST Alternative based on the investment-grade ridership forecasts.

Additional train emissions from potentially increased feeder service to the proposed HST service were also assessed based on predicted ridership forecasts.

3.2.3 Power Requirements:

In addition to the on-road and off-road emission burdens, emissions resulting from the power generated to run the HST system were estimated and included in the emission burden of the HST Alternative. [Emission estimates are based on British thermal unit (BTU) requirements calculated in the energy analysis for the project (see Section 3.5**.** BTU emission factors based are based on information from *Conserving Energy and Preserving the Environment: The Role of Public Transportation* (Shapiro et al. 2002), and the *Transportation Energy Data Book* (U.S. Department of Energy 2002).

Pollutant burdens generated by on-road (vehicles), off-road (planes, trains), and stationary (electric power generation) sources were combined and compared to No Project Alternative and. to each other, i.e. among the Modal and HST alternatives. Because of the nature of electrical power generation and the use of a grid system to distribute electrical power, it is not yet clear which facilities would be supplying power to the proposed HST system. Emission changes from power generation can therefore be predicted on a statewide level only

3.2.4 Rating Scheme

The relevance of the potential emission changes was assessed from a total pollutant burden and percentage change compared to the No Project alternative in the affected air basins and statewide. Depending on each air basin's attainment status, the predicted differences were ranked as a high (+ or -), medium (+ or -) or low (+ or -) impact. The ranking of high, medium, or low is based on the potential magnitude of the emission changes compared to the No Project emission inventory (on-road sources, planes, and trains) and the general conformity threshold levels for nonattainment and maintenance areas. The emission inventory is CARB's estimate of the amount of pollutants emitted into the atmosphere from major mobile, stationary, area-wide, and natural source categories over a specific period of time such as a day or a year. For this analysis the projected emission inventory for 2020 was used. The general conformity threshold is a level where a conformity determination is required if the project is predicted to equal or exceed specific burdens. A plus (+) impact would indicate a potential benefit to an air basin for a specific pollutant. A minus (-) impact would indicate a potential deterioration to a basin for a specific pollutant. For example, a high (+) impact would represent a considerable improvement in emissions, and a low (-) impact would represent a slight deterioration in emissions. A percent difference indicates the extent of potential impact on the air basin's projected emission budget. A regionally significant project for conformity purposes, as defined in TITLE 40—I.E. 40 C.F.R. § 51.852, is one that would produce direct and indirect potential impacts that represent 10 percent or more of a nonattainment or maintenance area's emission inventory for the pollutant. Any alternative that results in this level of impact was given a high (+) or (-) ranking.

Conformity determinations are required for all projects receiving federal funding. For projects where the total direct and indirect emissions changes would be below the amounts listed in Table 4, conformity is assumed. Any proposed alternative that results in this level of impact is given a low (+) or (-) ranking. Proposed alternatives that would potentially result in pollutant burdens between the low and high category are classified as medium. A net CO_2 analysis for each alternative that accounts for reductions/increases in vehicle fuel use, as well as changes in electricity production, is used in the conformity analysis.

Table 4
Pollutant Burden Rates Requiring a Conformity Determination

Pollutant	Area's Attainment Status	Tons (Metric Tons) / Year
O_3 (VOCs or NO_x)	Nonattainment – serious	50 (45)
	Nonattainment – severe	25 (23)
	Nonattainment – extreme	20 (18)
	Nonattainment – outside an ozone transport region	100 (91)
	Nonattainment– moderate/marginal inside an ozone transport region	50/100 (45/91) (VOC/ NO_x)
	NO_x maintenance	100 (91)
	VOC maintenance – outside ozone transport region	100 (91)
	VOC maintenance – inside ozone transport region	50 (45)
CO	Nonattainment – all	100 (91)
	Maintenance	100 (91)
PM_{10}	Nonattainment – moderate	100 (91)
	Nonattainment – serious	70 (64)
	Maintenance	100 (91)
Source: Code of Federal Regulations, Title 40, Part 51, Subpart W.		

3.2.5 LOCALIZED AIR QUALITY IMPACTS

To quantify a project's impact on local pollutant levels, a screening analysis was conducted based on overall traffic volumes and projected changes in volume-to-capacity (V/C) ratios and level of service estimates. Per state and national guidelines (Caltrans - Transportation Project-Level Carbon Monoxide Protocol, Revised December 1997 – UCD-ITS-RR-97-21,), baseline intersection level of service estimates of D or below that would degrade because of a project have the potential to affect local air quality. Similarly, volume increases of greater than 5 percent could potentially impact local air quality levels. The traffic analyses determined which roadways would experience an impact (positive or negative) under the project alternatives.

For this level of analysis, however, detailed intersection information has not been generated. Rather, traffic screenlines have been developed. *Screenlines* describe defined segments of a roadway that were selected to reasonably represent the routes affected by the proposed alternatives., as discussed in detail the T*raffic and Circulation of the EIS/EIR*. The estimated traffic volume generated or reduced by the Modal and HST Alternatives was added to No Project traffic volumes and expressed as overall screenline volumes (typical values based on averages over time), level of service, and V/C ratios. These factors were compared to No Project values, and locations with potentially high impacts were identified. The screenlines do not include an analysis of intersections and are therefore not detailed enough to be used for an air quality intersection screening analysis. However, the screenline numbers provide a general idea of the project's impact on the roadway network. Based on these numbers, general potential impacts on the local roadway network for each of the alternatives are discussed.

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 EXISTING CONDITIONS COMPARED TO NO PROJECT ALTERNATIVE

Pollutant burden levels of CO, NO_x, and TOG are predicted to decrease statewide through 2020 compared to 2002 levels. This decrease is due to the implementation of stringent standards, control measures, and state-of-the-art emission control technologies. Emissions per vehicle are dropping significantly in California as a result of CARB's clean vehicle and clean fuel programs. Consequently, motor vehicle emissions are declining overall despite an increase in VMT. The low emission vehicle (LEV) and LEVII regulations adopted in 1990 and 1998, respectively, require a declining average fleet emission rate for new cars, pickup trucks, and medium-duty vehicles (including sport utility vehicles). These regulations, which are being implemented between 1994 and 2010, are expected to result in about a 90 percent decline in new vehicle emissions. Similar emission reductions are occurring in the heavy-duty diesel truck fleet as progressively lower emission standards for new trucks are introduced. The next phase of tighter diesel truck standards, scheduled to be implemented between 2007 and 2010, is expected to produce an overall reduction of 98 percent from uncontrolled engine emissions.

According to CARB pollutant burden projections, emissions of PM_{10} are expected to increase statewide for the No Project Alternative compared to existing conditions. The upward trend in PM_{10} emissions is primarily due to increased emissions from area-wide sources, including dust from increased VMT on unpaved and paved roads. PM_{10} emissions from stationary sources are also expected to increase slightly in the future because of industrial growth.

2002 CO_2 levels are not currently available. In the November 2002 report "Inventory of California Greenhouse Gas Emissions and Sinks: 1990-1999) by the California Energy Commission, 1999 CO_2 emissions are estimated at 362.8 million metric tons. This estimate is not broken down by source type therefore a direct comparison between no project, which includes only on-road mobile, planes, trains and electric power sources, and the 1999 estimates cannot be make.

4.2 NO PROJECT ALTERNATIVE COMPARED TO MODAL ALTERNATIVE

4.2.1 Roadways

The highway component of the Modal Alternative would add approximately 2,970 lane miles (4780 km) to the highway system. According to the economic analysis in the EIR/EIS, the added lanes of the Modal Alternative would result in approximately 1.1 percent growth in VMT in 2020 than the No Project Alternative. No Project and Modal VMT is shown in Table 5. Therefore, the Modal Alternative is predicted to increase the amount of on-road mobile source regional pollutants by 1.1 percent compared to No Project in each air basin. The combined increases in the air basins represent an approximate .9 percent increase in on-road mobile pollutants when compared to Statewide burden levels. Emission burdens are shown in Table 6.

Table 5
On-Road Mobile Source VMT (Km) Projections – No Project and Modal Alternatives

	Sacramento Valley Air Basin	San Francisco Bay Area Air Basin	San Joaquin Valley Air Basin	Mojave Desert Air Basin	South Coast Air Basin	San Diego County Air Basin
No Project VMT (Km)	84,079,000 (135,312,000)	213,901,000 (344,240,000)	135,617,000 (218,254,000)	44,681,000 (71,907,000)	402,116,000 (647,143,000)	97,542,000 (156,977,000)
Modal Alternative VMT (Km)	85,003,869 (136,801,000)	216,253,911 / (348,025,000)	137,108,787 / (220,656,000)	45,172,491 / (72,697,000)	406,539,276/ (654,261,000)	98,614,962/ (158,704,000)

4.2.2 Air Travel:

The same number of air trips would occur under both the No Project and Modal Alternatives. In the No Project Alternative these trips would be handled in an inefficient manner (i.e., more flights leaving at off-peak times). In the Modal Alternative these flights would be handled in a more efficient manner. Airport gates would need to be added, however, to efficiently handle the forecasted future demand (representative demand). The air travel component of the Modal Alternative is based on an estimated additional 91 airport gates required statewide to efficiently service the 34 million trips (68 million boarding/departing passengers) as defined for the Modal Alternative in Chapter 2 of the EIR/EIS. The additional gates would handle the trips projected for year 2020 more efficiently than No Project. Since additional gates would be built under the Modal Alternative to serve demand already projected under No Project, the Modal Alternative would generate no more LTOs than the No Project Alternative; therefore, no more airplane pollutant burdens would be generated as compared to the No Project Alternative. No Project and Modal Alternative plane emission burdens are shown in Table 7.

4.2.3 Train Travel and Electrical Power:

Conventional rail service is not predicted to increase nor is additional electrical power predicted to be required under the Modal Alternative. Thus, the Modal Alternative would generate no more train or electrical power stationary pollutant burdens than No Project.

Table 6
On-Road Mobile Source Regional Analysis—No Project and Modal Alternatives

Air Basin	No Project VMT (Km) (2020) (in millions)	Modal VMT (Km) (2020) (in millions)	No Project Emission Burden in Tons (Metric Tons) / Day				Modal Alternative Emission Burden in Tons (Metric Tons) / Day				Incremental Change from No Project in Tons (Metric Tons) / Day and % Change from No Project			
			CO	PM10	NO_x	TOG	CO	PM10	NO_x	TOG	CO	PM10	NO_x	TOG
Sacramento Valley	84.079 (135.312)	85.004 (136.801)	203.67 (184.77)	4.63 (4.20)	31.57 (28.64)	28.33 (25.70)	205.9 (186.8)	4.7 (4.3)	31.9 (28.9)	28.6 (25.9)	2.2 (2.0)/ 1.1%	0.1 (0.1)/ 1.1	0.4 (0.4)/ 1.1%	0.3 (0.3)/ 1.1
San Francisco Bay Area	213.901 (344.240)	216.253 (348.025)	493.23 (447.45)	10.46 (9.49)	89.55 (81.24)	68.17 (61.84)	498.7 (452.4)	10.6 (9.6)	90.5 (82.1)	68.9 (62.5)	5.4 (4.9)/ 1.1%	0.1 (0.1)/ 1.1%	1.0 (0.9)/ 1.1%	0.8 (0.7)/ 1.1%
San Joaquin	135.617 (218.254)	137.109 (220.656)	336.18 (304.98)	9.30 (8.44)	61.59 (55.87)	41.01 (37.20)	339.9 (308.4)	9.4 (8.5)	62.3 (56.5)	41.5 (37.6)	3.7 (3.4)/ 1.1%	0.1 (0.1)/ 1.1%	0.7 (0.6)/ 1.1%	0.5 (0.5)/ 1.1%
Mojave Desert	44.681 (71.907)	45.172 (72.697)	93.55 (84.87)	2.39 (2.17)	12.75 (11.57)	5.49 (4.98)	94.6 (85.8)	2.4 (2.2)	12.9 (11.7)	5.6 (5.1)	1.0 (0.9)/ 1.1	0.03 (0.03)/ 1.1%	0.1 (0.1)/ 1.1%	0.1 (0.1)/ 1.1%
South Coast	402.116 (647.143)	406.539 (654.261)	1,007.32 (913.83)	24.65 (22.36)	150.30 (136.35)	133.50 (121.10)	1,018.4 (923.9)	24.9 (22.6)	152.0 (137.9)	135.0 (122.5)	11.1 (10.1)/ 1.1%	0.3 (0.03)/ 1.1%	1.7 (1.5)/ 1.1%	1.5 (1.4)/ 1.1%
San Diego County	97.542 (156.977)	98.614 (158.704)	229.10 (207.84)	5.64 (5.12)	35.59 (32.29)	29.68 (26.93)	231.6 (210.1)	5.7 (5.2)	36.0 (32.7)	30.0 (27.2)	2.5 (2.3)/ 1.1%	0.1 (0.01)/ 1.1%	0.4 (0.4)/ 1.1%	0.3 (0.3)/ 1.1%
Statewide (on-road mobile only)	1,109.510 (1,785.583)	1,099.637 (1,769.694)	2,769.19 (2,512.17)	64.71 (58.70)	444.81 (403.52)	366.34 (332.30)	2,795.2 (2536.0)	65.3 (59.2)	449.0 (407.3)	369.7 (335.4)	26.0 23.6/ 1.1%	.6 (.5)/ 1.1%	4.2 (3.8)/ 1.1%	3.4 (3.1)/ 1.1%

Table 7
Airplane Pollutant Burdens—No Project and Modal Alternatives

	2020 Planes No Project Alternative in Tons (Metric Tons) / Day				2020 Burden per Flight in Tons (Metric Tons) / Day*				Number of Additional Planes for Modal Alternative	2020 Additional Burden Modal Alternative in Tons (Metric Tons) / Day				2020 Total Plane Burden Modal Alternative in Tons (Metric Tons) / Day			
Air Basin	CO	PM10	NO_x	TOG	CO	PM10	NO_x	TOG		CO	PM10	NO_x	TOG	CO	PM10	NO_x	TOG
Sacramento Valley	19.35 (17.55)	0.16 (0.15)	2.45 (2.22)	2.50 (2.27)	0.024 (0.022)	.0001 (.00009)	.008 (.007)	.001 (.0009)	0	0.0	0.0	0.0	0.0	19.35 (17.55)	0.16 (0.15)	2.45 (2.22)	2.50 (2.27)
San Francisco Bay Area	57.11 (51.81)	2.35 (2.13)	24.14 (21.90)	13.05 (11.84)	0.024 (0.022)	.0001 (.00009)	.008 (.007)	.001 (.0009)	0	0.0	0.0	0.0	0.0	57.11 (51.81)	2.35 (2.13)	24.14 (21.90)	13.05 (11.84)
San Joaquin	77.00 (69.85)	0.45 (0.41)	4.30 (3.90)	15.96 (14.48)	0.024 (0.022)	.0001 (.00009)	.008 (.007)	.001 (.0009)	0	0.0	0.0	0.0	0.0	77.00 (69.85)	0.45 (0.41)	4.30 (3.90)	15.96 (14.48)
Mojave Desert	22.71 (20.60)	3.01 (2.73)	3.29 (2.98)	5.49 (4.98)	0.024 (0.022)	.0001 (.00009)	.008 (.007)	.001 (.0009)	0	0.0	0.0	0.0	0.0	22.71 (20.60)	3.01 (2.73)	3.29 (2.98)	5.49 (4.98)
South Coast	68.79 (62.41)	0.50 (0.45)	26.97 24.47)	9.04 (8.20)	0.024 (0.022)	.0001 (.00009)	.008 (.007)	.001 (.0009)	0	0.0	0.0	0.0	0.0	68.79 (62.41)	0.50 (0.45)	26.97 (24.47)	9.04 (8.20)
San Diego County	19.65 (17.83)	1.69 (1.53)	8.42 (7.64)	3.81 (3.46)	0.024 (0.022)	.0001 (.00009)	.008 (.007)	.001 (.0009)	0	0.0	0.0	0.0	0.0	19.65 (17.83)	1.69 (1.53)	8.42 (7.64)	3.81 (3.46)
Statewide (on-road mobile only)	312.89 (283.85)	8.80 (7.98)	73.27 (66.47)	56.17 (50.96)	0.024 (0.022)	.0001 (.00009)	.008 (.007)	.001 (.0009)	0	0.0	0.0	0.0	0.0	312.89 (283.85)	8.80 (7.98)	73.27 (66.47)	56.17 (50.96)

* Flight emissions from FAA EDMS model. Flight emission information is for default 737 and associated ground support.

4.3 No Project Alternative Compared to High-Speed Train Alternative (Sensitivity Analysis Variations in Ridership Forecast)

The proposed HST Alternative (with sensitivity analysis forecasts) would have the capacity to accommodate an estimated 68 million annual trips that would otherwise use roadways and airports statewide. The highway component is based on potential VMT reductions resulting from 42.7 million annual trips. The air travel component is based on potential reductions from 25.3 million trips.

4.3.1 Roadways

The proposed HST Alternative could potentially take the place of a 42.7 million city-to-city annual trips using on-road mobile sources and would therefore potentially reduce VMT on the state highway system compared to the No Project and Modal Alternatives. Changes in VMT and estimated on-road mobile source emission reductions resulting from the use of the proposed HST have been calculated for each of the five air basins (Table 8). The highest on-road mobile source emission reductions are predicted for the San Joaquin Valley Air Basin. The HST Alternative is predicted to reduce the 2020 CARB CO mobile source emission budget for San Joaquin Valley Air Basin by about 3.3% or 11.1 tons (10.1 metric tons). The South Coast Air Basin would receive the next highest potential pollutant reductions (on-road mobile source only), followed by the San Francisco Bay Area, San Diego County, Sacramento Valley, and Mojave Desert Air Basins.

4.3.2 Air Travel

The air-travel component is based on 25.3 million trips (1 trip = 1 takeoff and 1 landing) being shifted from the airplane component of No Project future conditions to the proposed HST. The emission burden reductions projected from the reduced number of flights, shown in Table 9, was calculated by determining the number of flights that could be accommodated by the proposed HST and multiplying that number by the emission estimates of an average flight, as described above in the discussion of methods of evaluating impacts. The emission changes by air basin resulting from the reduced number of flights range from an estimated 17% reduction in NO_x in the Sacramento Valley Air Basin to no change in the Mojave Desert Air Basin. The South Coast Air Basin is projected to have the largest potential reductions, followed by San Francisco Bay Area, San Diego County, Sacramento Valley, and San Joaquin Valley Air Basins. No reductions would be expected in the Mojave Desert Air Basin.

Statewide, an estimated 99% reduction is predicted in the plane portion of the CO_2 budget estimated for the No Project Alternative. This is approximately 37% of the calculated CO_2 budget for the No Project. CO_2 calculations for No Project Alternative reflect only emissions from electrical power stations, planes, and a portion of on-road VMT. For the plane portion of CARB's projected 2020 emission burden budgets, an 8% reduction is predicted in NO_x, a 6% reduction is predicted in CO, a 2% reduction in TOG, and a 1% reduction in PM10.

4.3.3 Train Travel and Electrical Power:

Conventional rail service is not predicted to increase under the proposed HST Alternative therefore no change in pollutant burdens is predicted due to train travel.

Additional electrical power would be required to operate the HST system. Because of the nature of electrical power generation and the use of a grid system to distribute electrical power, it is not yet clear which facilities would be supplying power to the HST system. Emission changes from power generation can therefore be predicted on a statewide level only. As shown in Table 10, CO, PM10, NO_x, and TOG burden levels would be predicted to increase because of the power requirements of the proposed HST Alternative. A 23% increase representing approximately 14 tons (13 metric tons) statewide daily is predicted in the electric utilities portion of the CO 2020 CARB emission burden projection. This increase would represent less than 0.3% of the overall CO budget for the State of California.

4.3.4 Summary of Pollutants by Alternative:

Table 11 summarizes the combined source categories for the existing conditions and No Project, Modal, and HST (with sensitivity analysis forecasts) Alternatives. Compared to the No Project Alternative, the HST Alternative (with sensitivity analysis forecasts) is predicted to decrease the amount of pollutants statewide in all air basins analyzed. Potential air quality benefits range from medium to low. CO_2 levels are also detailed in Table 11. CO_2 burden levels were estimated based on energy projections developed for each alternative.

4.3.5 Local Impacts:

A total of 508 local screenline locations were analyzed. The general trend in screenline data shows that the level of service in the vicinity of proposed HST station locations would degrade under the HST Alternative. Capacity improvements under the Modal Alternative would generally prevent degradation in level of service at the proposed station sites, but V/C ratios would increase slightly. A V/C ratio is the comparison of the roadway volume to roadway capacity. A V/C of 1.0 would indicate a roadway at capacity. As the alternatives are refined and more in-depth studies are undertaken in future analyses, intersections near proposed HST station locations and any location where volumes would likely increase and V/C ratios degrade should be screened to determine if more detailed local analyses should be conducted to insure that the project does not cause a violation of the ambient air quality standards.

Table 8
On-Road Mobile Source Regional Emissions Analysis—No Project Alternative and HST Sensitivity Analysis Alternative

Air Basin	No Project VMT (Km) 2020 (in millions)	HST Sensitivity Analysis Alt. VMT (Km) 2020 (in millions)	No Project Emission Burden in Tons (Metric Tons) / Day				HST Sensitivity Analysis Alternative Emission Burdenin Tons (Metric Tons) / Day				Incremental Change from No Project in Tons (Metric Tons) / Day and % Reduction from No Project			
			CO	PM10	NO_x	TOG	CO	PM10	NO_x	TOG	CO	PM10	NO_x	TOG
Sacramento Valley	84.079 (135.312)	83.832 (134.914)	203.67 (184.77)	4.63 (4.20)	31.57 (28.64)	28.33 (25.70)	203.07 (184.222)	4.61 (4.18)	31.47 (28.55)	28.24 (25.62)	0.598 (0.542)/ 0.29%	0.014 (0.013))/ 0.29%	0.093 (0.084)/ 0.29%	0.083 (0.075)/ 0.29%
San Francisco Bay Area	213.901 (344.240)	212.734 (342.362)	493.23 (447.45)	10.46 (9.49)	89.55 (81.24)	68.17 (61.84)	490.54 (445.01)	10.41 (9.44)	89.06 (80.79)	67.80 (61.51)	2.691 (2.441)/ 0.55%	0.057 (0.052)/ 0.55%	0.489 (0.444)/ 0.55%	0.372 (0.337)/ 0.55%
San Joaquin	135.617 (218.254)	131.132 (211.037)	336.18 (304.98)	9.30 (8.44)	61.59 (55.87)	41.01 (37.20)	325.06 (294.89)	9.0 (8.16)	59.55 (54.02)	39.65 (35.97)	11.12 (10.09)/ 3.3%	0.308 (0.279)/ 3.3%	2.037 (1.848)/ 3.3%	1.356 (1.230)/ 3.3%
Mojave Desert	44.681 (71.907)	44.671 (71.891)	93.55 (84.87)	2.39 (2.17)	12.75 (11.57)	5.49 (4.98)	93.52 (84.84)	2.39 (2.17)	12.75 (11.57)	5.49 (4.98)	0.021 (0.019)/ 0.02%	0.001 (0.001)/ 0.02%	0.003 (0.003)/ 0.02%	0.001 (0.001)/ 0.02%
South Coast	402.116 (647.143)	398.682 (641.617)	1,007.32 (913.83)	24.65 (22.36)	150.30 (136.35)	133.50 (121.10)	998.72 (906.02)	24.44 (22.17)	149.02 (135.19)	132.36 (120.08)	8.603 (7.805)/ 0.85%	0.211 (0.191)/ 0.85%	1.284 (1.165)/ 0.85%	1.140 (1.034)/ 0.85%
San Diego County	97.542 (156.977)	97.013 (156.127)	229.10 (207.84)	5.64 (5.12)	35.59 (32.29)	29.68 (26.93)	227.86 (206.71)	5.61 (5.09)	35.40 (32.11)	29.52 (26.78)	1.243 (1.128)/ 0.54%	0.031 (0.028)/ 0.54%	0.193 (0.175)/ 0.54%	0.161 (0.146)/ 0.54%
Statewide (on-road mobile only)	1,109.510 (1,785.583)	1,088.880 (1,752.382)	2,769.19 (2,512.17)	64.71 (58.70)	444.81 (403.52)	366.34 (332.30)	2,744.91 (2,490.14)	64.09 (58.14)	440.71 (399.81)	363.23 (329.52)	24.28 (22.03)/ 0.88%	0.62 (0.56)/ 0.96%	4.10 (3.72)/ 0.92	3.114 (2.825)/ 0.85%

Table 9
Airplane Emission Burdens—No Project Alternative and HST Sensitivity Analysis Alternative

	2020 Airplanes—No Project in Tons (Metric Tons) / Day				2020 Emissions Burden per Flight in Tons (Metric Tons) / Day*				Number of Additional Planes for HST Sensitivity Analysis Alternative	2020 Additional Emissions Burden—HST Sensitivity Analysis Alternative in Tons (Metric Tons) / Day				2020 Total Plane Emissions Burden—HST Sensitivity Analysis Alternative in Tons (Metric Tons) / Day and % Change from No Project			
Air Basin	CO	PM10	NO_x	TOG	CO	PM10	NO_x	TOG		CO	PM10	NO_x	TOG	CO	PM10	NO_x	TOG
Sacramento Valley	19.35 (17.55)	0.16 (0.15)	2.45 (2.22)	2.50 (2.27)	0.024 (0.022)	.0001 (.0001)	.008 (.007)	.001 (.0009)	-52	-1.3 (-1.2)	-0.003 (-0.003)	-0.4 (-0.4)	-0.1 (-0.1)	18.1 (16.4)/ -7%	0.2 (0.2)/ -2%	2.0 (1.8)/ -17%	2.4 (2.2)/ -3%
San Francisco Bay Area	57.11 (51.1)	2.35 (2.13)	24.14 (21.90)	13.05 (11.84)	0.024 (0.022)	.0001 (.0001)	.008 (.007)	.001 (.0009)	-297	-7.2 (-6.5)	-0.018 (-0.016)	-2.3 (-2.1)	-0.4 (-0.4)	49.9 (45.3)/ -13%	2.3 (2.1)/ -1%	21.8 (19.8) / -10%	12.7 (11.5) / -3%
San Joaquin	77.00 (69.85)	0.45 (0.41)	4.30 (3.90)	15.96 (14.48)	0.024 (0.022)	.0001 (.0001)	.008 (.007)	.001 (.0009)	-15	-0.4 (-0.4)	-0.001 (-0.0009)	-0.1 (-0.1)	0.0	76.6 (69.5)/ 0%	0.4 (0.4)/ 0%	4.2 (3.8)/ -3%	15.9 (14.4) / 0%
Mojave Desert	22.71 (20.60)	3.01 (2.73)	3.29 (2.98)	5.49 (4.98)	0.024 (0.022)	.0001 (.0001)	.008 (.007)	.001 (.0009)	0	0.0	0.0	0.0	0.0	22.7 (20.6)/ 0%	3.0 (2.7)/ 0%	3.3 (3.0)/ 0%	5.5 (5.0)/ 0%
South Coast	68.79 (20.60)	0.50 (0.45)	26.97 (24.47)	9.04 (8.20)	0.024 (0.022)	.0001 (.0001)	.008 (.007)	.001 (.0009)	-305	-7.4 (-6.7)	-0.018 (-0.016)	-2.4 (-2.2)	-0.4 (-0.4)	61.4 (55.7)/ -11%	0.5 (0.5)/ -4%	24.6 (22.3) / -9%	8.7 (7.9)/ -4%
San Diego County	19.65 (17.83)	1.69 (1.53)	8.42 (7.64)	3.81 (3.46)	0.024 (0.022)	.0001 (.0001)	.008 (.007)	.001 (.0009)	-102	-2.5 (-2.3)	-0.006 (-0.005)	-0.8 (-0.7)	-0.1 (-0.1)	17.2 (15.6)/ -13%	1.7 (1.5)/ 0%	7.6 (6.9)/ -9%	3.7 (3.4)/ -3%
Statewide (on-road mobile only)	312.89 (283.85)	8.80 (7.98)	73.27 (66.47)	56.17 (50.96)	0.024 (0.022)	.0001 (.0001)	.008 (.007)	.001 (.0009)	-771	-18.5 (-16.8)	-0.046 (-0.042)	-6.0 (-5.4)	-1.0 (-0.9)	294.4 (267.1) / -6%	8.8 (8.0)/ -1%	67.3 (61.1) / -8%	55.2 (50.1) / -2%

Table 10
Electrical Power Station Emissions—No Project Alternative and HST Sensitivity Analysis Alternative

	No Project Emission Burden—Electric in Tons (Metric Tons) / Day				HST Sensitivity Analysis Alternative Emission Burden—Electric in Tons (Metric Tons) / Day				Incremental Change from No Project in Tons (Metric Tons) / Day and % Change from No Project			
Air Basin	CO	PM10	NO_x	TOG	CO	PM10	NO_x	TOG	CO	PM10	NO_x	TOG
Statewide	61.99 (56.24)	6.11 (5.54)	38.33 (34.77)	39.24 (35.60)	75.97 (68.92)	6.13 (5.56)	38.47 (34.90)	40.32 (36.58)	13.98 (12.68)/ 22.55%	0.02 (.02)/ 0.36%	0.14 (.13)/ 0.36%	1.09 (.99)/ 2.77%

Table 11
Potential Impacts on Air Quality Statewide—Existing, No Project, Modal, and HST Sensitivity Analysis Alternatives

	Sacramento Valley Air Basin	San Francisco Bay Area Air Basin	San Joaquin Valley Air Basin	Mojave Desert Air Basin	South Coast Air Basin	San Diego County Air Basin	Statewide
Existing (2003) on-road mobile, trains, planes, and electrical utilities* emission burdens in tons (metric tons)/day							
CO	931.79 (845.31)	2,186.71 (1,983.75)	1,462.98 (1,327.19)	357.48 (324.30)	4,304.27 (3,904.77)	984.05 (892.72)	11,920.99 (10,814.54)
PM10	4.66 (4.23)	12.49 (11.33)	7.2 (6.5)	5.04 (4.57)	21.41 (19.42)	5.15 (4.67)	64.85 (58.83)
O_3 precursor—NO_x	166.24 (150.81)	368.2 (334.0)	261.70 (237.41)	78.43 (71.15)	685.84 (622.18)	150.04 (136.11)	1,962.04 (1,779.93)
O_3 precursor—TOG	107.42 (99.45)	258.0 (234.05)	160.76 (145.84)	40.58 (36.81)	481.44 (436.76)	107.43 (97.46)	1,353.08 (1,227.49)
No project on-road mobile, trains, planes, and electrical utilities* emission burdens in tons (metric tons)/day							
CO	225.01 (204.13)	551.70 (500.49)	415.67 (377.09)	122.88 (111.47)	1,080.59 (980.29)	248.94 (225.83)	3,164.37 (2,870.67)
PM10	5.14 (4.66)	13.03 (11.82)	10.09 (9.15)	6.08 (5.52)	25.70 (23.31)	7.38 (6.70)	82.38 (74.74)
O_3 precursor—NO_x	43.84 (39.77)	119.72 (108.61)	75.99 (68.94)	34.67 (31.45)	186.55 (169.23)	45.11 (40.92)	624.92 (566.92)
O_3 precursor—TOG	31.45 (28.53)	81.65 (74.07)	57.76 (52.40)	13.14 (11.92)	144.01 (130.64)	33.55 (30.44)	468.28 (424.82)
CO_2	N/A	N/A	N/A	N/A	N/A	N/A	1,438,816.9 (1,305,272.7)
Modal Alternative (2020) burden in tons (metric tons)/day and % change in CO, PM10, NO_x, TOG, CO_2 emission burdens compared to No Project							
CO_2	N/A	N/A	N/A	N/A	N/A	N/A	1,438,816.9 (1,305,272.74)
PM10	5.19 (4.71)/ 0.99%	13.15 (11.93)/ 0.88%	10.19 (9.24)/ 1.01%	6.10 (5.53)/ 0.43%	25.97 (23.56)/ 1.06%	7.44 (6.75)/ 0.84%	83.00 (75.30)/ 0.76%
O_3 precursor—NO_x	44.18 (40.08)/ 0.79%	120.71 (109.51)/ 0.82%	76.67 (69.55)/ 0.89%	34.81 (31.58)/ 0.40%	188.20 (170.73)/ 0.89%	45.50 (41.28)/ 0.87%	629.11 (570.72)/ 0.67%
O_3 precursor—TOG	31.76 (28.81)/ 0.99%	82.40 (74.75)/ 0.92%	58.21 (52.81)/ 0.78%	13.20 (11.97)/ 0.46%	145.48 (131.98)/ 1.02%	33.88 (30.74)/ 0.97%	471.65 (427.87)/ 0.72%
CO_2	N/A	N/A	N/A	N/A	N/A	N/A	1,439,163.08 (1,305,586.78)/ 0.00%
Potential Modal Impacts*							
CO	Medium -	Medium -	Medium -	Medium -	Medium -	Medium -	Medium -

	Sacramento Valley Air Basin	San Francisco Bay Area Air Basin	San Joaquin Valley Air Basin	Mojave Desert Air Basin	South Coast Air Basin	San Diego County Air Basin	Statewide
PM10	Low -	Low -	Low -	Low -	Medium -	Low -	Low -
NO_x	Medium -	Medium -	Medium -	Medium -	Medium -	Medium -	Medium -
TOG	Medium -	Medium -	Medium -	Low -	Medium -	Medium -	Medium -
PM10	Low -	Low -	Low -	Low -	Medium -	Low -	Low -
CO_2	N/A	N/A	N/A	N/A	N/A	N/A	Low -
HST Alternative (2020) burden in tons (metric tons) and % change in CO, PM10, NO_x, TOG, CO_2 emission burdens compared to No Project							
CO	223.15 (202.44)/ - 0.83%	541.79 (491.50)/ -1.80%	404.18 (366.67)/ -2.76%	122.86 (111.46)/ -0.02%	1,064.58 (965.77)/ -1.48%	245.22 (222.46)/ -1.50%	3,135.33 (2,844.32)/ -0.92%
PM10	5.13 (4.65)/ -0.32%	12.96 (11.76)/ -0.57%	9.78 (8.87)/ -3.06%	6.08 (5.52)/ -0.00%	25.47 (23.11)/ -0.89%	7.34 (6.66)/ -0.50%	81.73 (74.14)/ -0.78%
O_3 precursor—NO_x	43.34 (39.32)/ -1.13%	116.92 (106.07)/ -2.34%	73.84 (66.99)/ -2.83%	34.67 (31.45)/ - 0.01%	182.89 (165.92)/ -1.96%	44.12 (40.02)/ -2.19%	614.96 (557.88)/ -1.59%
O_3 precursor—TOG	31.30 (28.39)/ -0.47%	80.90 (73.39)/ -0.92%	56.39 (51.16)/ -2.38%	13.14 (11.92)/ - 0.00%	142.49 (129.26)/ -1.06%	33.26 (30.17)/ - 0.87%	465.27 (422.09)/ -0.64%
CO_2	N/A	N/A	N/A	N/A	N/A	N/A	1,418,265.15 / - 1.43%
Potential HST Regional Impacts*							
CO	Medium +	Medium +	Medium +	Low +	Medium +	Medium +	Medium +
PM10	Low +	Low +	Low +	Low +	Low +	Low +	Low +
NO_x	Medium +	Medium +	Medium +	Low +	Medium +	Medium +	Medium +
TOG	Medium +	Medium +	Medium +	Low +	Medium +	Medium +	Medium +
CO_2	N/A	N/A	N/A	N/A	N/A	N/A	Low +

Notes:

Potential impacts determined using threshold levels and attainment status detailed in Section 3.3.1.

+ = Benefit to air quality.

- = Deterioration in air quality.

N/A = Not Applicable.

CO_2 is analyzed only on a statewide level.

* Emission burdens from electrical utilities are included only in the statewide totals. CO_2 burdens do not include train emissions.

4.4 No Project Alternative Compared to High-Speed Train Alternative (Investment-Grade Ridership Forecasts)

The proposed HST Alternative, using investment-grade ridership forecasts, would potentially accommodate an estimated 42 million annual trips, which would otherwise use roadways and airports statewide. The highway component is based on potential VMT reductions from 26.6 million annual trips. The air-travel component is based on 15.4 million trips.

4.4.1 Roadways

The proposed HST Alternative (using investment-grade ridership forecasts) would accommodate city-to-city trips, reducing VMT on the state highway system compared to the No Project and Modal Alternatives. Changes in VMT and on-road mobile source emission burdens have been calculated for each potentially affected air basin (Table 12) resulting from the estimated 26.6 million vehicle trips that would use the proposed HST Alternative. The highest on-road mobile source emission burden reductions are projected for the San Joaquin Valley Air Basin. The proposed HST system is predicted to reduce the 2020 CARB CO mobile source emissions for the San Joaquin Valley Air Basin by approximately 1.6% or 5.4 tons (4.9 metric tons) daily. The South Coast Air Basin would have the next highest predicted pollutant burden reductions (on-road mobile source only), followed by the San Francisco Bay Area, San Diego County, Sacramento Valley, and Mojave Desert Air Basins.

4.4.2 Air Travel

The HST Alternative would replace city-to-city trips using off-road mobile (air) travel modes. The air-travel component is based on 15.4 million trips (1 trip = 1 takeoff and 1 landing) from the airplane component of No Project conditions. The emissions projected to be saved from the reduced flights, shown in Table 13, were calculated by determining the number of flights that could be reduced by the proposed HST and multiplying that number by the emission estimates for an average flight, as described above in the discussion of methods of evaluating impacts. The emission burdens by air basin calculated for the reduced flights would range from a 10% reduction in NO_x for the Sacramento Valley Air Basin to no change in the Mojave Desert Air Basin. The South Coast Air Basin is projected to have the largest burden reductions, followed by San Francisco Bay Area, San Diego County, Sacramento Valley, and San Joaquin Valley Air Basins. No reductions would be expected in the Mojave Desert Air Basin.

Statewide, a 60% reduction is projected in the plane portion of the CO_2 budget estimated for No Project. This reduction would be approximately 23% of the calculated CO_2 budget for the No Project Alternative. CO_2 calculations for the No Project Alternative reflect only emissions from electrical power stations, planes, and a portion of on-road VMT. For the plane portion of CARB's projected 2020 emission budgets, a 5% reduction is projected in NO_x; a 4% reduction is predicted in CO; a 1% reduction in TOG; and a reduction of less than 1% in PM10.

4.4.3 Train Travel and Electrical Power:

Conventional rail service is not predicted to increase under the proposed HST Alternative.

Additional electrical power would be required to operate the proposed HST system. Because of the nature of electrical power generation and the use of a grid system to distribute electrical power, it is not yet clear which facilities would be supplying power to the proposed HST system. Emission changes from power generation can therefore be predicted on a statewide level only. As shown in Table 14, CO, PM10, NO_x, and TOG burden levels are predicted to increase statewide because of the power requirements of the HST. A 23% increase in emissions representing approximately 12 tons (11 metric tons) daily is predicted in the electric utilities portion of the CO 2020 CARB emission projection. This increase would represent less than 0.3% of the overall CO budget for the State of California.

4.4.4 Summary of Pollutants by Alternatives:

Table 15 summarizes the combined source categories for existing conditions and the No Project, Modal, and HST Alternatives. Compared to the No Project Alternative, the proposed HST Alternative (with investment-grade ridership forecasts) is projected to result in a decrease in the amount of pollutants statewide and in all air basins analyzed. Potential air quality benefits would range from a medium to a low rating.

4.4.5 Local Impacts:

A total of 508 local screenline locations were analyzed. The general trend in screenline data shows that the level of service in the vicinity of proposed HST station locations would degrade under the HST Alternative. Capacity improvements under the Modal Alternative would generally prevent degradation in level of service at the proposed station sites, but V/C ratios would increase slightly. As the alternatives are refined and more in-depth studies are undertaken in future analyses, intersections near proposed HST station locations and any location where volumes would likely increase and V/C ratios degrade should be screened to determine if more detailed local analyses should be conducted to insure that the project does not cause a violation of the ambient air quality standards.

Table 12
On-Road Mobile Source Emission Regional Analysis—No Project Alternative and HST Investment-Grade Ridership Forecast Alternative

Air Basin	No Project VMT (Km) 2020 (in millions)	HST Investment-Grade Ridership Forecast Alt. VMT (Km) 2020 (in millions)	No Project Emission Burden in Tons (Metric Tons)/Day				HST Investment-Grade Ridership Forecast Alternative Emission Burden in Tons (Metric Tons)/Day				Incremental Change from No Project in Tons (Metric Tons)/Day and % Reduction from No Project			
			CO	PM10	NO_x	TOG	CO	PM10	NO_x	TOG	CO	PM10	NO_x	TOG
Sacramento Valley	84.079 (135.312)	83.948 (135.101)	203.67 (184.77)	4.63 (4.20)	31.57 (28.64)	28.33 (25.70)	203.35 (184.48)	4.62 (4.19)	31.52 (28.59)	28.28 (25.66)	0.316 (0.287)/ 0.2%	0.007 (0.006) / 0.2%	0.049 (0.044)/ 0.2%	0.044 (0.040)/ 0.2%
San Francisco Bay Area	213.901 (344.240)	213.215 (343.136)	493.23 (447.45)	10.46 (9.49)	89.55 (81.24)	68.17 (61.84)	491.65 (446.02)	10.43 (9.46)	90.53 (82.13)	67.95 (61.64)	1.583 (1.436)/ 0.3%	0.034 (0.031) / 0.3%	0.287 (0.260)/ 0.3%	0.219 (0.199)/ 0.3%
San Joaquin Valley	135.617 (218.254)	133.449 (214.765)	336.18 (304.98)	9.30 (8.44)	61.59 (55.87)	41.01 (37.20)	330.81 (300.11)	9.16 (8.31)	62.27 (56.49)	40.35 (36.60)	5.375 (4.876)/ 1.6%	0.149 (0.135) / 1.6%	0.985 (0.894)/ 1.6%	0.656 (0.595)/ 1.6%
Mojave Desert	44.681 (71.907)	44.673 (71.894)	93.55 (84.87)	2.39 (2.17)	12.75 (11.57)	5.49 (4.98)	93.53 (84.85)	2.39 (2.17)	12.89 (11.69)	5.49 (4.98)	0.017 (0.015)/ 0.0%	0.000/ 0.0%	0.002 (0.002)/ 0.0%	0.001 (0.001)/ 0.0%
South Coast	402.116 (647.143)	399.899 (643.575)	1,007.32 (913.83)	24.65 (22.36)	150.30 (136.35)	133.50 (121.10)	1,001.76 (908.78)	24.52 (22.23)	151.96 (137.86)	132.77 (120.45)	5.554 (5.039)/ 0.6%	0.136 (0.123) / 0.6%	0.829 (0.752)/ 0.6%	0.736 (0.668)/ 0.6%
San Diego County	97.542 (156.977)	97.279 (156.555)	229.10 (207.84)	5.64 (5.12)	35.59 (32.29)	29.68 (26.93)	228.48 (207.27)	5.63 (5.11)	35.98 (32.64)	29.60 (26.85)	0.618 (0.561)/ 0.3%	0.015 (0.014) / 0.3%	0.096 (0.087)/ 0.3%	0.080 (0.073)/ 0.3%
Statewide (on-road mobile only)	1,109.510 (1,785.583)	1,104.036 (1,776.774)	2,769.19 (2,512.17)	64.71 (58.70)	444.81 (403.52)	366.34 (332.30)	2,755.52 (2,499.77)	64.37 (58.40)	449.70 (407.96)	364.61 (330.77)	13.46 (12.21)/ 0.5%	0.34 (0.31)/ 0.5%	2.25 (2.04)/ 0.5%	1.74 (1.59)/ 0.5%

Table 13
Airplane Emission Burdens—No Project Alternative and HST Investment-Grade Ridership Forecast Alternative

	2020 Planes—No Project in Tons (Metric Tons)/Day				2020 Emission Burden per Flight in Tons (Metric Tons)/Day*				# of Planes Removed by HST Investment-Grade Ridership Forecast Alt.	2020 Additional Emission Burden—HST Investment-Grade Ridership Forecast Alternative in Tons (Metric Tons)/Day				2020 Total Plane Emissions Burden—HST Investment-Grade Ridership Forecast Alternative in Tons (Metric Tons)/Day and % Change from No Project			
Air Basin	CO	PM10	NO_x	TOG	CO	PM10	NO_x	TOG		CO	PM10	NO_x	TOG	CO	PM10	NO_x	TOG
Sacramento Valley	19.35 (17.55)	0.16 (0.15)	2.45 (2.22)	2.50 (2.27)	0.024 (0.022)	.0001 (.0001)	.008 (.007)	.001 (.0009)	31	-0.75 (-0.68)	-0.002 (-0.002)	-0.241 (-0.219)	-0.039 (-0.035)	18.594 (16.868)/ -4%	0.160 (0.145)/ -1.%	2.205 (2.000)/ -10%	2.463 (2.234)/ -2%
San Francisco Bay Area	57.11 (51.1)	2.35 (2.13)	24.14 (21.90)	13.05 (11.84)	0.024 (0.022)	.0001 (.0001)	.008 (.007)	.001 (.0009)	181	-4.4 (-4.0)	-0.011 (-0.010)	-1.408 (-1.277)	-0.230 (-0.209)	52.711 (47.819)/ -8%	2.338 (2.121)/ 0%	22.735 (20.625)/ -6%	12.818 (11.628)/ -2%
San Joaquin Valley	77.00 (69.85)	0.45 (0.41)	4.30 (3.90)	15.96 (14.48)	0.024 (0.022)	.0001 (.0001)	.008 (.007)	.001 (.0009)	9	-0.219 (-0.199)	-0.001 (-0.001)	-0.070 (-0.064)	-0.011 (-0.010)	76.777 (69.651)/ 0%	0.446 (0.405)/ 0%	4.225 (3.833)/ -2%	15.95 (14.47)/ 0%
Mojave Desert	22.71 (20.60)	3.01 (2.73)	3.29 (2.98)	5.49 (4.98)	0.024 (0.022)	.0001 (.0001)	.008 (.007)	.001 (.0009)	0	0.00	0.00	0.00	0.00	22.713 (20.605)/ 0%	3.010 (2.731)/ 0%	3.290 (2.985)/ 0%	5.490 (4.980)/ 0%
South Coast	68.79 (20.60)	0.50 (0.45)	26.97 (24.47)	9.04 (8.20)	0.024 (0.022)	.0001 (.0001)	.008 (.007)	.001 (.0009)	186	-4.522 (-4.102)	-0.011 (-0.010)	-1.447 (-1.313)	-0.236 (-0.214)	64.269 (58.304)/ -7%	0.492 (0.446)/ -2%	25.526 (23.157)/ -5%	8.803 (7.986)/ -3%
San Diego County	19.65 (17.83)	1.69 (1.53)	8.42 (7.64)	3.81 (3.46)	0.024 (0.022)	.0001 (.0001)	.008 (.007)	.001 (.0009)	62	-1.507 (-1.367)	-0.004 (-0.004)	-0.482 (-0.437)	-0.079 (-0.072)	18.147 (16.463)/ -8%	1.688 (1.531)/ 0%	7.936 (7.199)/ -6%	3.727 (3.381)/ -2%
Statewide (on-road mobile only)	312.89 (283.85)	8.80 (7.98)	73.27 (66.47)	56.17 (50.96)	0.024 (0.022)	.0001 (.0001)	.008 (.007)	.001 (.0009)	469	-11.40 (-10.34)	-0.028 (-0.025)	-3.649 (-3.310)	-0.596 (-0.541)	301.48 (273.50)/ -4%	8.772 (7.958)/ -0%	69.624 (63.162)/ -5%	55.57 (50.41)/ -1%

Table 14
Electrical Power—No Project Alternative and HST Investment-Grade Ridership Forecast Alternative

	No Project Emission Burden—Electric in Tons (Metric Tons)/Day				HST Investment-Grade Ridership Forecast Alternative Emission Burden—Electric in Tons (Metric Tons)/Day				Incremental Change from No Project in Tons (Metric Tons)/Day/Percent Change from No Project			
Air Basin	CO	PM10	NO_x	TOG	CO	PM10	NO_x	TOG	CO	PM10	NO_x	TOG
Statewide	61.99 (56.24)	6.11 (5.54)	38.33 (34.77)	39.24 (35.60)	73.87 (67.01)	6.12 (5.55)	38.45 (34.88)	40.16 (36.43)	11.88 (10.78)/ 19%	0.02 (0.02)/ 0.36%	0.14 (0.13)/ 0.36%	1.09 (0.99)/ 2.77%

Table 15
Potential Impacts on Air Quality Statewide—Existing, No Project, Modal, and HST Investment-Grade Ridership Alternatives

	Sacramento Valley Air Basin	San Francisco Bay Area Air Basin	San Joaquin Valley Air Basin	Mojave Desert Air Basin	South Coast Air Basin	San Diego Air Basin	Statewide
Existing (2003) on-road mobile, trains, planes, and electrical utilities* emission burdens in tons (metric tons)/day							
CO	931.79 (845.31)	2,186.71 (1,983.75)	1,462.98 (1,327.19)	357.48 (324.30)	4,304.27 (3,904.77)	984.05 (892.72)	11,920.99 (10,814.54)
PM10	4.66 (4.23)	12.49 (11.33)	7.2 (6.5)	5.04 (4.57)	21.41 (19.42)	5.15 (4.67)	64.85 (58.83)
O_3 precursor—NO_x	166.24 (150.81)	368.2 (334.0)	261.70 (237.41)	78.43 (71.15)	685.84 (622.18)	150.04 (136.11)	1,962.04 (1,779.93)
O_3 precursor—TOG	107.42 (99.45)	258.0 (234.05)	160.76 (145.84)	40.58 (36.81)	481.44 (436.76)	107.43 (97.46)	1,353.08 (1,227.49)
No Project (2020) on-road mobile, trains, planes, and electrical utilities* emission burdens in tons (metric tons)/day							
CO	225.01 (204.13)	551.70 (500.49)	415.67 (377.09)	122.88 (111.47)	1,080.59 (980.29)	248.94 (225.83)	3,164.37 (2,870.67)
PM10	5.14 (4.66)	13.03 (11.82)	10.09 (9.15)	6.08 (5.52)	25.70 (23.31)	7.38 (6.70)	82.38 (74.74)
O_3 precursor—NO_x	43.84 (39.77)	119.72 (108.61)	75.99 (68.94)	34.67 (31.45)	186.55 (169.23)	45.11 (40.92)	624.92 (566.92)
O_3 precursor—TOG	31.45 (28.53)	81.65 (74.07)	57.76 (52.40)	13.14 (11.92)	144.01 (130.64)	33.55 (30.44)	468.28 (424.82)
CO_2	N/A	N/A	N/A	N/A	N/A	N/A	1,438,816.9 (1,305,272.7)
Modal Alternative (2020) burden in tons (metric tons)/day and % change in CO, PM10, NO_x, TOG, CO_2 emission burdens compared to No Project							
CO	227.25 (206.16)/ 1.00%	557.13 (505.42)/ 0.98%	419.37 (380.45)/ 0.89%	123.91 (112.41)/ 0.84%	1,091.67 (990.35)/ 1.03%	251.46 (228.12)/ 1.01%	3,190.37 (2,894.25)/ 0.82%
PM10	5.19 (4.71)/ 0.99%	13.15 (11.93)/ 0.88%	10.19 (9.24)/ 1.01%	6.10 (5.53)/ 0.43%	25.97 (23.56)/ 1.06%	7.44 (6.75)/ 0.84%	83.00 (75.30)/ 0.76%
O_3 precursor—NO_x	44.18 (40.08)/ 0.79%	120.71 (109.51)/ 0.82%	76.67 (69.55)/ 0.89%	34.81 (31.58)/ 0.40%	188.20 (170.73)/ 0.89%	45.50 (41.28)/ 0.87%	629.11 (570.72)/ 0.67%
O_3 precursor—TOG	31.76 (28.81)/ 0.99%	82.40 (74.75)/ 0.92%	58.21 (52.81)/ 0.78%	13.20 (11.97)/ 0.46%	145.48 (131.98)/ 1.02%	33.88 (30.74)/ 0.97%	471.65 (427.87)/ 0.72%
CO_2	N/A	N/A	N/A	N/A	N/A	N/A	1,439,163.08 (1,305,586.78)/ 0.00%
Potential Modal Impacts*							
CO	Medium -	Medium -	Medium -	Medium -	Medium -	Medium -	Medium -

	Sacramento Valley Air Basin	San Francisco Bay Area Air Basin	San Joaquin Valley Air Basin	Mojave Desert Air Basin	South Coast Air Basin	San Diego Air Basin	Statewide
PM10	Low -	Low -	Low -	Low -	Medium -	Low -	Low -
NO_x	Medium -	Medium -	Medium -	Medium -	Medium -	Medium -	Medium -
TOG	Medium -	Medium -	Medium -	Low -	Medium -	Medium -	Medium -
CO_2	N/A	N/A	N/A	N/A	N/A	N/A	Low -
HST Alternative (2020) burden in tons (metric tons)/day and % change in CO, PM10, NO_x, TOG, CO_2 emission burdens compared to No Project							
CO	223.94 (203.15)/ -0.48%	545.72 (495.07)/ -1.08%	410.07 (372.01)/ -1.35%	122.86 (111.46)/ -0.01%	1,070.52 (971.16)/ -0.93%	246.81 (223.90)/ -0.85%	3,151.39 (2,858.89)/ -0.41%
PM10	5.13 (4.65)/ -0.18%	12.99 (11.78)/ -0.34%	9.94 (9.02)/ -1.48%	6.08 (5.52)/ -0.01%	25.55 (23.18)/ -0.57%	7.36 (6.68)/ -0.26%	82.03 (74.42)/ - 0.43%
O_3 precursor—NO_x	43.55 (39.51)/ -0.66%	118.03 (107.08)/ -1.42%	74.93 (67.98)/ -1.39%	34.67 (31.45)/ - 0.01%	184.27 (167.17)/ -1.22%	44.53 (40.40)/ -1.28%	619.13 (561.67)/ -0.93%
O_3 precursor—TOG	31.37 (28.46)/ -0.27%	81.20 (73.66)/ -0.55%	57.09 (51.79)/ -1.15%	13.14 (11.92)/ - 0.01%	143.04 (129.76)/ -0.68%	33.40 (30.30)/ - 0.47%	466.87 (423.54)/ -0.30%
CO_2	N/A	N/A	N/A	N/A	N/A	N/A	1,432,412.18 (1,299,462.47)/ -0.45%
Potential HST Regional Impacts*							
CO	Medium +	Medium +	Medium +	Low +	Medium +	Medium +	Medium +
PM10	Low +	Low +	Low +	Low +	Low +	Low +	Low +
NO_x	Medium +	Medium +	Medium +	Low +	Medium +	Medium +	Medium +
TOG	Medium +	Medium +	Medium +	Low +	Medium +	Medium +	Medium +
CO_2	N/A	N/A	N/A	N/A	N/A	N/A	Low +

Notes:
Potential Impacts determined using threshold levels and attainment status as detailed in Section 3.3.1.
+ = Benefit to air quality
- = Deterioration in air quality
N/A = Not Applicable
CO_2 is analyzed only on a statewide level.

* Emission burdens from electrical utilities are included only in the statewide totals. CO_2 burdens do not include train emissions.

5.0 MITIGATION STRATEGIES

The program-level analysis in this document reviews the potential statewide air quality impacts of a proposed HST system and the analysis would support determination of conformity for the proposed HST system. At the project level potential mitigation strategies should be explored to address potential localized impacts. Emissions from power plants supplying power to the proposed HST system could be controlled at those power plants as required under air pollution control permits. The proposed HST system could be designed to use state-of-the-art, energy-efficient equipment to minimize potential air pollution impacts associated with power used by the proposed HST system. Potential localized impacts could be addressed at the project level by promoting the following measures.

- Increase use of public transit.
- Increase use of alternative-fueled vehicles.
- Increase parking for carpools, bicycles, and other alternative transportation methods.

Potential construction impacts, which should be analyzed once more detailed project plans are available, can be mitigated by following local and state guidelines.

5.1 SUBSEQUENT ANALYSIS

More detail on the impact of the potential changes in vehicle hours traveled (VHT) in the regional analysis should be available for the next phase of the environmental analysis. HST alignment options should also be refined for the next phase of analysis. Once alignments are selected, if a decision is made to proceed with the proposed HST system, then local traffic counts could be conducted at access roads serving major station locations. These counts would provide more accurate information for determining potential local air quality hotspot locations. Hotspots are areas where the potential for elevated pollutant levels exist. Once hotspot locations (if any) are determined, a detailed analysis following the guidelines at the time of analysis should be conducted.

Potential construction impacts and potential mitigation measures should also be addressed in subsequent analyses. Once an alternative and alignment is established a full construction analysis should be conducted. This analysis should quantify emissions from construction vehicles, excavation, worker trips, and other related construction activities. Mitigation measures, if required, should be detailed and a construction monitoring program, if required should be established.

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7.0 PERSONS AND AGENCIES CONSULTED

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